WIRE AND WIRE PRODUCTS

NOVEMBER 1942

WE'RE WORKING 'ROUND THE CLOCK TO DO OUR SHARE FOR VICTORY!

Vaughn Wire Drawing Machinery is being produced under the most urgent schedules in our history, for the mills at work for war. And an achievement of equal importance—to the wire manufacturer as it is to us—is the consistent adherence to the highest possible quality standards throughout our production.

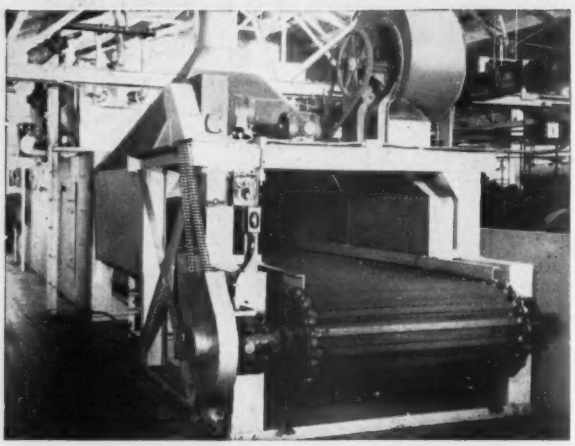
V

VAUGHN WIRE DRAWING MACHINERY
THE VAUGHN MACHINERY COMPANY
CUYAHOGA FALLS, OHIO, U. S. A.

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

Carl-Mayer

INDUSTRIAL FURNACES
• • •
ROD BAKERS
• • •
WELDING ROD OVENS



CARL-MAYER SHELL FURNACES

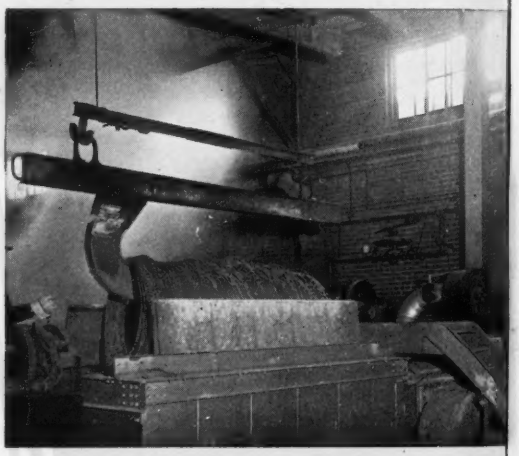
For stress relieving shot and shells from 20 to 105 mm. Carl-Mayer Recirculating air heater furnaces for stress relief, drawing, tempering and heat treating, are famous for their fast heating cycle, uniformity and fuel economy. Users include many of America's leading plants.

Carl-Mayer Speed . . . . . a *Weapon* that *Quickens* Victory!

CARL-MAYER'S CREATIVE ENGINEERING has a background of many notable achievements in SPEED, EFFICIENCY, OPERATING and FUEL ECONOMY. Proven ability to outperform has made Carl-Mayer Furnaces and Ovens invaluable in war production.

OVER 20 YEARS' EXPERIENCE

THE CARL-MAYER CORPORATION
3030 EUCLID AVE., CLEVELAND, OHIO



CARL-MAYER HI-SPEED TRADE MARK ROD BAKERS

The fastest rod baker built! Saves up to 50% in time and fuel. Blow-Off Feature removes moisture without bumping or agitating the coils.

PATENT NOS.
U. S. A. — 2235559 and 2296361
CANADA — 396144 and 401589

Other patent claims allowed and pending.

Carl-Mayer Furnaces and Ovens Serve Customers Like These:

Allegheny Ludlum Steel Co.
Aluminum Co. of America
Atlantic Wire Co.
Atlas Steel Co.
American Magnesium Corp.
Bridgeport Brass Co.
Eclipse Aviation Division of Bendix Aviation Corp.
Ford Motor Co.
General Motors Corp.
Hollup Corporation
Hyatt Roller Bearing Co.
Johnson & Nephew, Ltd.
Page Steel & Wire Co.
Pittsburgh Tool Steel Wire Co.
Reliance Manufacturing Co.
Steel Co. of Canada
Timken Roller Bearing Co.
Thompson Products Co.
Weatherhead Co.
Wickwire Spencer Steel Co.

UP TO 50 TIMES GREATER GUIDE LIFE ON YOUR WIRE STRANDING MACHINES

Standard CARBOLOY TRADEMARK Guide Rings...

The extreme resistance of cemented carbides to abrasive wear provides unusually long periods of continuous operation on all applications involving wear factors. Typical of the use of carbides for wear resistant purposes is their application on wire stranding machines.

Carboloy Cemented Carbide Guide Rings are standard on many well known makes of stranding machines, increasing life as much as 50 to 1 over previous types of guides. The result is a substantial reduction of downtime for guide ring changes and increased productive output.

Standard-design Carboloy Cemented Carbide Guide Rings are available in several hole sizes ranging from 0.147" to 0.690", made of solid Carboloy Cemented Carbide with polished surfaces.

Prices are well within an economical range. For example, size 0.147 ranges in price from 55c each in quantities of 1-49 to 18c in quantities of 3000 and over. Complete price list and specifications upon request.

CARBOLOY COMPANY, INC., DETROIT, MICHIGAN

Sole makers of the Carboloy brand of cemented carbides

Chicago • Cleveland • Los Angeles • Newark • Philadelphia • Pittsburgh • Seattle

Authorized Distributors: Hartley Wire Die Co., Thomaston, Conn.; Canadian General Electric Co., Ltd., Toronto, Canada

CARBOLOY TRADEMARK **CEMENTED CARBIDES** TRADEMARK

COMPLETE DIE SERVICE FOR WIRE, BAR, TUBING AND SHEET METAL

Battleship armor *vs.* manufacturer's wire

Compared to the steel tonnage going into war production, the peacetime tonnage of manufacturer's wire is not large.

But, in this all-out war, every pound of steel Bethlehem can make is urgently needed for gun forgings, tank parts, cargo ships, battleship armor and scores of other "musts."

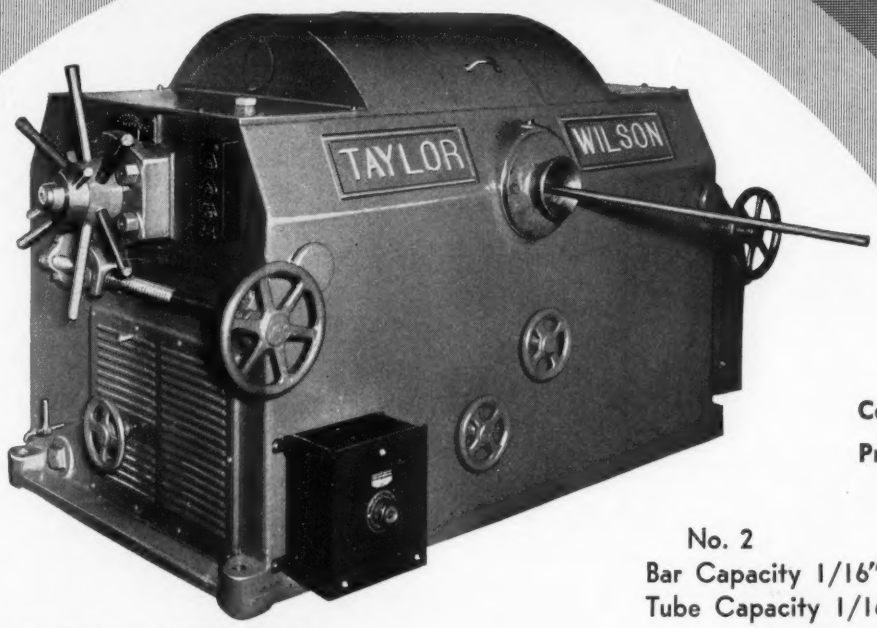
We are fully aware that our many friends and customers are making great sacrifices in behalf of the war effort, and making them gladly, because they realize that everything we have or ever hope to have is at stake.

However, we want you to know that as soon as the war is won, we will again be supplying Bethlehem wire in a full range of grades and sizes. Lessons learned in war production will further enhance the quality of our wire, and expand its use in new fields. We sincerely hope that you will be among those we can serve.

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

TAYLOR-WILSON
Straightening Machines



Sturdy • Vibrationless

Constant Precision

No. 2
Bar Capacity 1/16" to 2½"
Tube Capacity 1/16" to 3"

PRODUCTION UP TO 250 FEET PER MINUTE

Yes, Taylor-Wilson Machines will give you production in straightening up to 250 feet per minute on mild steel stocks. On all jobs of straightening, sizing and burnishing, production speed is limited only by the capacity of motor and angle of rolls.

Accuracy and uniformity in performance may be depended upon at all speeds.

Compact, economical in operation, capable of long, continuous service.

Write for descriptive folder.

TAYLOR-WILSON MFG CO.
17 Thomson Ave., McKees Rocks, Pa.
PITTSBURGH DISTRICT

THE *New* STANDARD FLUID DRIVE

Suitable for Many Uses, Including:

Variable Speeds

Constant Surface Cutting Speed

- Vertical Boring Mill Facing Cuts
- Lathe Facing Cuts

Controlled Acceleration and Deceleration

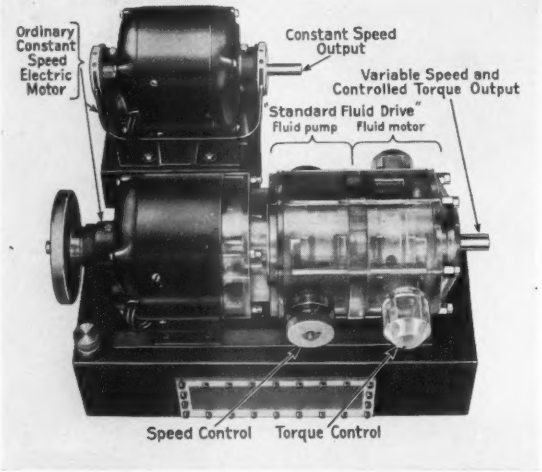
- Heavy Machine Tool Table Feeds
- Hydraulic Press Ram Control
- Hoisting

Servo or Follow-Up Operations

- Profiling
- Steering Gear

Stepless Speed Adjustment

- Conveyor Drive



Controlled Torque

Constant Tension Take Up

- Wire and Strip Reeling
- Draw Bench Drives
- Textile Loom Warp Winding

Constant Tension Pay Off

- Cable and Rope Stranding
- Textile Loom Warp Unwinding

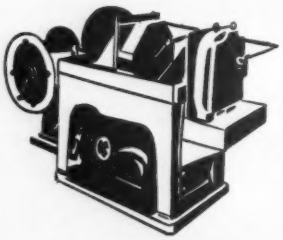
Coordinated Tandem Drive

- Tandem Rolling Mills
- Multiple Die Wire Drawing
- Paper Mills

Torque Amplification

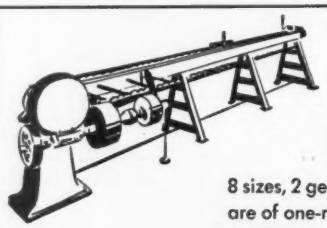
- Finger Tip Control of Heavy Machinery

AT THE METAL SHOW in Cleveland this model of the NEW Standard Fluid Drive attracted much favorable attention — as did the other machines in our regular line, shown below. We will be glad to furnish additional information about any of this equipment.



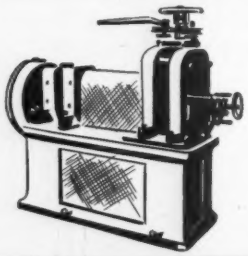
TURKS HEADS

Adjustable draw plates —accepted by wire trade as accurate, efficient means of producing rectangular and special shapes. With friction or power driven rolls. Catalog TH.



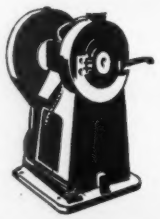
DRAW BENCHES

8 sizes, 2 general types. Machines are of one-man type with all controls at die end. Catalog DB.



ROLLING MILLS
STRIP AND WIRE

Roller bearing and plain bearing mills; many regular sizes or made to suit user's specific needs. Write fully.



SWAGING MACHINES

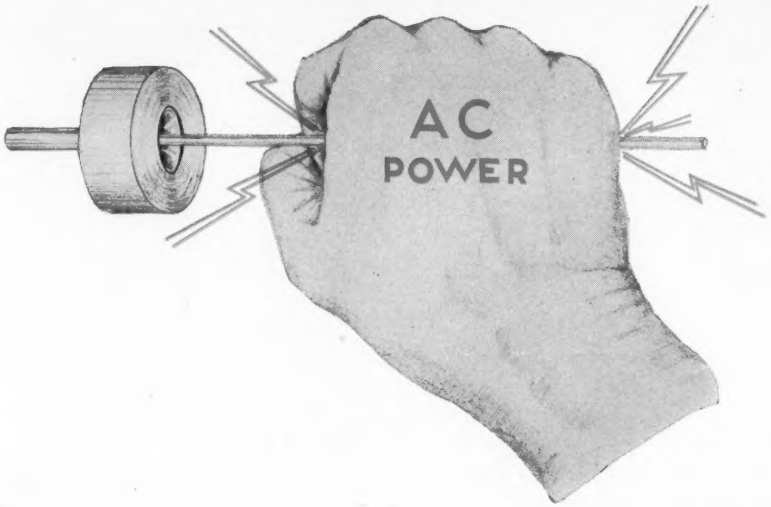
For reducing diameter of tubular and solid bar stock into cylindrical, conical, or "necked" shapes. Capacities from ½" tube, ¼" solid to 6" tube or 3¾" solid. Catalog SM.

STANDARD MACHINERY CO.

PROVIDENCE . . . . RHODE ISLAND

SYNCRO

SYNCRO LENDS A HAND TO CONSERVATION OF CRITICAL MATERIALS



A MESSAGE

The application of AC Power to machine drives represents an important TWO-WAY conservation measure.

FIRST — By making use of basically simple motors and control, requiring a minimum of critical materials.

SECOND — By making direct use of the largest existing power source, without recourse to conversion with its attending economic losses, and additional equipment requirements.

SYNCRO research in the field of continuous drawing of both ferrous and non-ferrous wire has, from the first, been carried on with the thought that machine and drive should be considered as an integral design based on the most efficient combining of machine and the prime mover.

SYNCRO AC WIRE DRAWING AND PROCESSING MACHINES ENSURE:

Saving in critical materials and investment.
Your selection of speeds to suit drafting or process.
New and proven designs of adequate flexibility.
Consistent production at selected speeds.
Reliability and reserve capacity.
Operation with a minimum of control equipment.

To obtain the ultimate in productive capacity, economy and efficiency, consult Syncro.

SYNCRO MACHINE COMPANY

RAHWAY, NEW JERSEY
McCORMICK BLDG., CHICAGO

REPRESENTED IN CANADA BY CANADIAN ELEVATOR EQUIPMENT CO. LTD., TORONTO

Machinery for the Wire Industry

SYNCRO

MORE • BETTER • FASTER

with High Performance

Vascoloy RAMET

More production, better finish, and closer tolerance — these are the conditions that have to be met today and faster than ever before.

In drawing, heading, and extruding operations, large tonnage to close tolerance, minimum friction and die wear, and smooth finish free of score marks — these are the highlights in the performance of Vascoloy - Ramet Tantalum - Tungsten Carbide Dies. These too, are the reasons for converting to such dies wherever high performance must be counted on for uninterrupted day-in-and-day-out production.

Tantalum-Tungsten Carbide Dies are now used for countless forming, nosing, drawing, cupping and extruding operations on articles of war materiel. Our special die department offers its services and experience to manufacturers making products requiring these operations.

Tell us your problems. If carbide dies can be used to advantage, we will design and produce Tantalum - Tungsten Carbide Dies that will assure you the ultimate in performance.

TANTALUM-TUNGSTEN CARBIDE DIES

for

DRAWING

For drawing fine wire, heavy wire, special shapes, tubing, etc. For shell and cartridge cases from the blank to completed case.

COLD HEADING

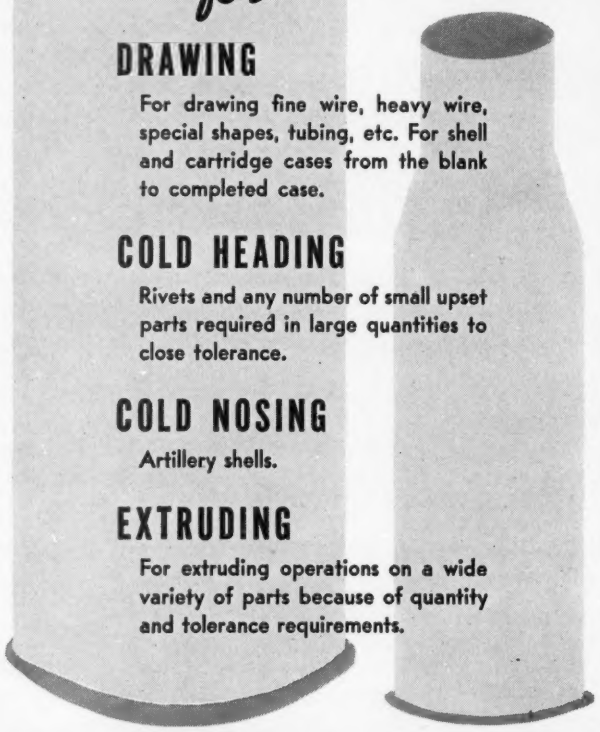
Rivets and any number of small upset parts required in large quantities to close tolerance.

COLD NOSING

Artillery shells.

EXTRUDING

For extruding operations on a wide variety of parts because of quantity and tolerance requirements.



VASCOLOY-RAMET CORPORATION

NORTH CHICAGO, ILLINOIS

DISTRICT SALES AND SERVICE IN PRINCIPAL CITIES

IN CANADA: Carbide Tool & Die Company, Ltd., Hamilton, Ont.

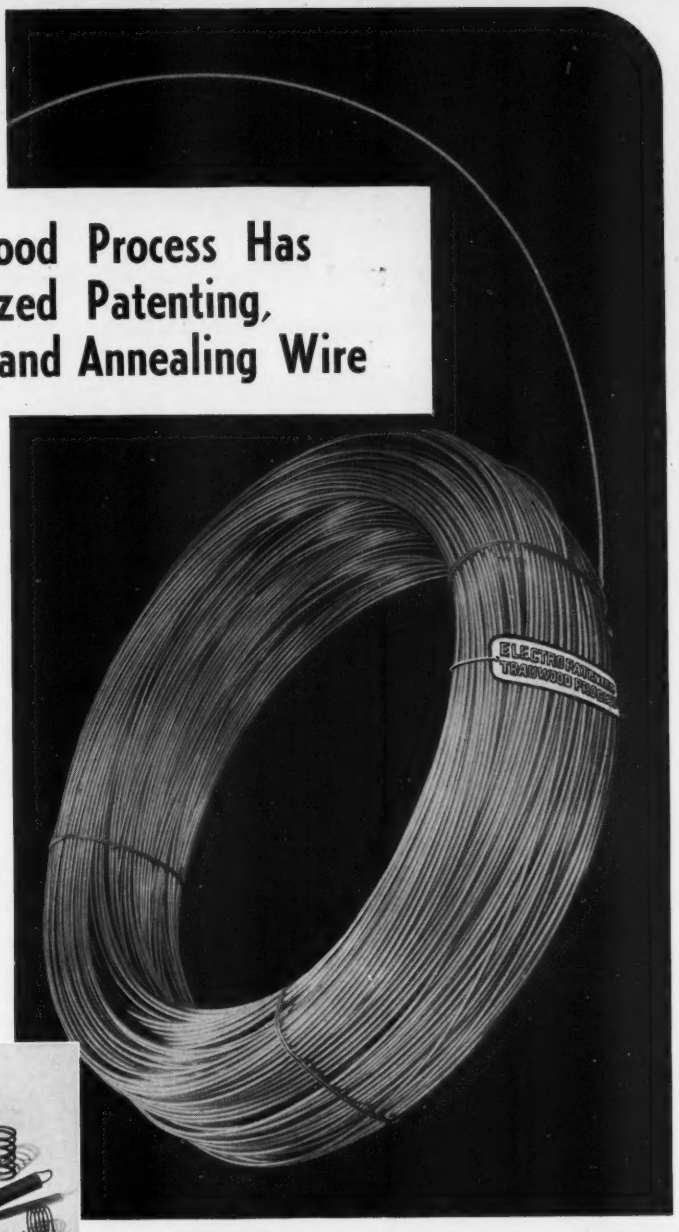
4247

TANTALUM-TUNGSTEN CARBIDE

FOR HIGH PERFORMANCE . . . *Specify* Vascoloy RAMET DIES

There's No Question About It

The Trauwood Process Has Revolutionized Patenting, Tempering, and Annealing Wire



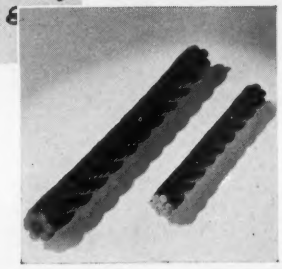
The Trauwood Process is not dependent upon the human equation. It automatically and continuously patents, tempers or anneals wire and strip by a remarkable new Electric Direct Resistance Method.

The Trauwood Process is being used by a number of the largest manufacturers of heat treated wire in the United States. It has sped up and vastly improved their output. It produces at all times wire that is absolutely uniform, with the highest possible physical and fatigue properties.

The Trauwood Process is doing its share to help speed the war effort by supplying better heat treated wire — faster and more economically.

OUTSTANDING ADVANTAGES

Much faster production . . . . No decarburization or scale . . . . Fully automatic — human equation eliminated . . . . Easy to operate . . . . Control of heating and cooling cycles extremely accurate . . . . Low cost operation . . . . High thermal efficiency . . . . Uniform physical and fatigue properties.



Trauwood

Our Engineering staff will be glad to cooperate with you. Further information will be sent upon request.

THE TRAUWOOD ENGINEERING COMPANY

1740 E. 23rd Street

Cleveland, Ohio

Satisfying the NEED FOR PREPARING FOR FUTURE OPERATIONS

One of the most important factors in business or military strategy is *preparing for future operations.* When the battle of production began, owners of Morgan Wire Drawing Machinery were ready . . . prepared for preparedness! Today, Morgan machines are delivering great quantities of wire for war—speedily, efficiently. Looking ahead to the future has always been a Morgan policy. Maybe we can help you now—in preparing for *your* future operations.

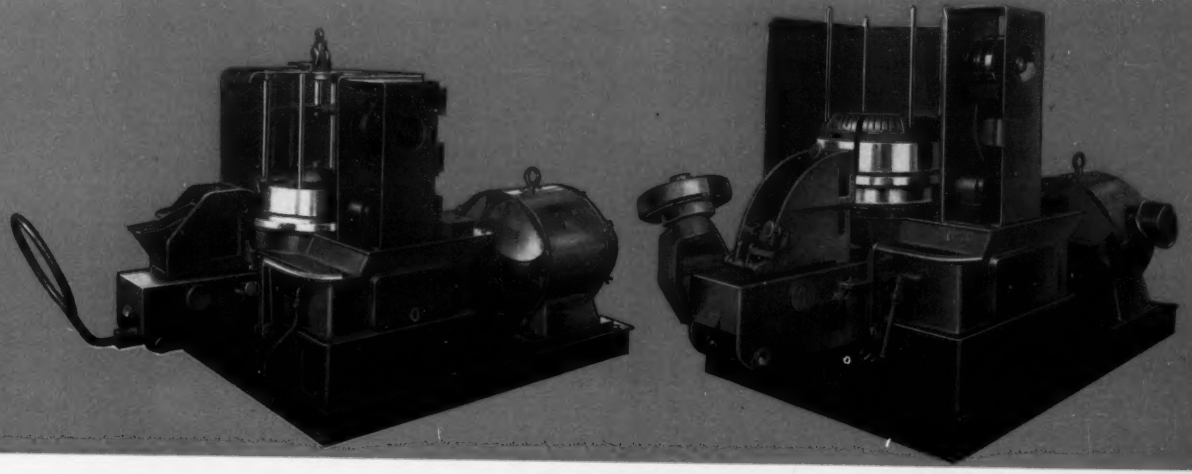
W-76

MORGAN CONSTRUCTION COMPANY, WORCESTER, MASS.
Continuous Wire Drawing Machines; Take-up Frames; Horizontal Bull Blocks; Vertical Spindle Bull Blocks; Reels; Pointers; Wire Mill Accessories.

MORGAN VERTICAL SPINDLE WIRE BLOCKS

Morgan Vertical Spindle Wire Blocks introduce important new features in this type of wire drawing equipment. Single and double deck blocks. Interchangeable blocks. Die boxes fully adjustable for horizontal or vertical cast and equipped to receive all common sizes of die holders.

Each machine is unit powered, driven by combination spiral bevel and helical gears that give high efficiency at all ratios. Air-cooled blocks embody new patented fin-type construction, resulting in great dissipation of heat. Modern safety devices.



WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 17 NOVEMBER, 1942 No. 11

Designated as

Official Publication By The Wire Association

Contents

The Wire Industry's Part in Industrial Conservation ..... By Ivon B. Tilyou 647
An address delivered at the opening session of the Wire Association Convention.

Relaxation Resistance of Nickel-Alloy Springs By B. B. Betty, E. C. MacQueen and Carl Rolle 653

Wire Association Convention Highlights 663
Details of the Convention held at Cleveland, October 1942.

Government Wire Production Information 666

Outstanding Personalities of the Wire Industry 670

A Review of Recent Wire Patents 672

Index to Advertisers 685

Where to Buy 685-688

— ASSOCIATE EDITORS —

Kenneth B. Lewis, Consulting Wire Mill Engineer
W. H. Spowers, Jr., Consultant on Galvanizing
Lancaster, Allwine & Rommel, Consultants on Patent Information

Richard E. Brown, General Manager
R. S. Spengel, Business Manager
E. D. Sickels, Advertising Manager

Publication Office: Washington, N. J.
Executive Office: Stamford Trust Co. Bldg., 300 Main St., Stamford, Conn.

Annual Subscription, U. S. $5.00, Canada $5.00

50 Cents a Copy in U. S. Issued Monthly Foreign, $7.50

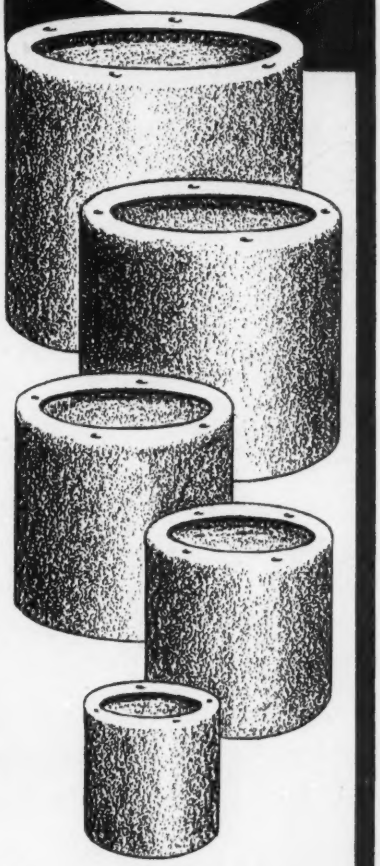
October Convention Issue $1.00 a Copy

January Convention Discussions Issue $1.00 a Copy

Copyright 1942, Quinn-Brown Publishing Corp. WIRE AND WIRE PRODUCTS is fully protected by copyright and nothing that appears in it may be reprinted wholly or in part without permission.

WIRE & WIRE PRODUCTS, Vol. 17, No. 11, November, 1942, Executive Office, 300 Main St., Stamford, Conn. Published by the Quinn-Brown Publishing Corp., Richard E. Brown, President; R. S. Spengel, Secretary and Treasurer. Publication office, 13 West Church Street, Washington, N. J. Subscription price: U. S., $5.00; Canada, $5.00 per year, 50 cents per copy; Foreign, $7.50 per year. Entered as second class mail at the Post Office, Washington, N. J., under Act of March, 1879.

STEVENS DRUMS



From actual experience records, we can give you seven reasons why Stevens Drums for Reels will fill the bill for you. Write for them today.

Manufactured under license arrangements with Western Electric Company, Incorporated.

THE STEVENS METAL PRODUCTS CO.,
NILES, OHIO

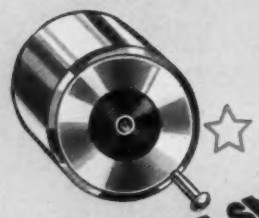
FIRTHALOY COLD-HEADING DIES

MAKE 'EM "FIT" FOR VICTORY!

"ACCURACY in mass production." That's what FIRTHALOY users accomplish when heading close-tolerance aircraft hex-head bolts, aircraft clevis pins and bolts, cap screws, machine screws, rivets, etc.

Used at first to head only small sizes of plain carbon steel and non-ferrous metals, FIRTHALOY Carbide Heading Dies gave higher output **and** sustained precision—through continuous operation and long die life. But now, with equal success, FIRTHALOY is heading bolts as large as the one below.

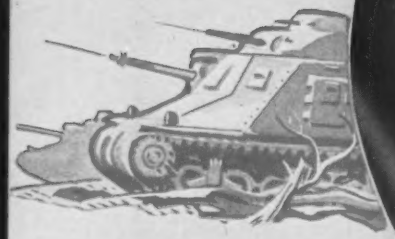
FIRTHALOY also shows its heading efficiency on high-alloy steels, considerably more difficult to head than plain carbon steel.



FIRTH-STERLING STEEL COMPANY

Offices: McKEESPORT, PA. NEW YORK - HARTFORD - PHILADELPHIA - CLEVELAND
DAYTON - DETROIT - CHICAGO - LOS ANGELES

FROM THE SMALLEST TO THE LARGEST



FIRTH-STERLING FIRTHALOY QUALITY

FIRTHALOY

WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
Wire Products and Insulated Wire and Cable.
DRAWING --- ROLLING --- EXTRUDING --- FORMING --- FABRICATING

Vol. 17 NOVEMBER, 1942 No. 11

The Wire Industry's Part In Industrial Salvage

By Ivon B. Tilyou,

Assistant Utility Coordinator,
Industrial Salvage Section, War Production Board,
Washington, D. C.

An address delivered at the opening session of The Annual Wire Association Convention at Cleveland, Ohio, on Monday, October 12, 1942. ✦ ✦ ✦

MR. President, members of the Wire Association and guests.

✦ ✦ ✦

THE Conservation Division of the War Production Board is grateful for the opportunity, afforded by your Committee, to describe to you gentlemen the work which we have been asked to do as our share of the War Effort.

✦ ✦ ✦

THE work being done by American Industry, representatives of many of them appearing here. is certainly a glorious answer to Mr. Hitler's question concerning the strength of the American Nation. I know of no production goal established by our President that has not been surpassed, both in numbers and time limits.

✦ ✦ ✦

THIS organization, composed as it is, principally of industrialists, appreciates the vast importance that scrap plays within given industry. You know better than we in the WPB, the percentage of each billet, that goes back to the furnace by the way of the scrap box, but do you realize where the metal originated that made your first ingot? I must speak generally, since there are representatives here from mills producing everything from pin wire to million circular mill electric cable and larger and from surgical steel to electrolytic copper.

IVON B. TILYOU

Educated at Rensselaer Polytechnic Institute in Electrical Engineering. Twelve years with the New York State Electric & Gas Corp. Design Construction and Operating of Power Company transmission, distribution and substations. Four years with Copper Wire Engineering Association doing advisory and promotional Engineering on Rural Power Lines. One year with Chase Brass & Copper Company in the Consulting Engineer's office.

✦ ✦ ✦

FOR 1942, steel ingot production will probably reach over 86 million net tons. 45 percent of the material required to make these steel ingots will be iron and steel scrap. Together with the iron scrap needed for iron foundries, which are also being taxed to produce their full of war orders, the total iron and steel scrap needed for 1942 iron and steel production is in the neighborhood of 60 million net tons. Probably 75 to 80 percent of this tonnage comes from known and predictable sources, such as the iron and steel industry which produces the bulk of its own scrap by trimming and rolling the ingots down to fabricated products, and other industrial plants which produce iron and steel scrap in the course of their manufacturing operations.

Designated as Official Publication by the Wire Association

THE remaining 12 million tons comes from less certain and predictable sources. Farms, homes and business establishments of this country, the automobile graveyards, and the demolition and scrapping of obsolete and useless structures and equipment, will account for approximately 3,000,000 tons. The balance or 9,000,000 tons, must come from the dormant scrap that lies about industries such as yours. To date, during this year, the collection of scrap has just about kept pace with consumption needs, but it has not permitted the accumulation of sufficient inventories in consumers' and dealers' yards to assure the satisfaction of consumption needs during the winter months ahead, when the rate of scrap collections normally falls off below the consumption rate. For this reason approximately 4,000,000 tons in addition must be obtained before winter sets in, 3,000,000 tons of which must come from industries' dormant scrap.

✦ ✦ ✦

IN the case of copper, I can state that the latest estimate of requirements for the year 1942 exceed the supply by more than 150,000 net tons, and this supply takes into account the estimated production of primary and secondary copper plus imports. Thus, despite the many restrictions in the uses of copper which have already been imposed by the War Production Board, there is still a need for more copper to meet our program requirements. A considerable part of this 150,000 ton deficiency can only be made up from scrap made available in excess of the expected supply.

✦ ✦ ✦

WITH regard to rubber, you are all familiar with the **Baruch** report to the President and will soon be affected by it.

✦ ✦ ✦

STATISTICS are probably as boring to you as they are to me, but I do want to impress upon you the important role that scrap materials play in our war effort. An easy way to comprehend this fact is to remember these few statements. Nearly half the raw material required to make steel is scrap iron and steel. Over one-fourth of our domestic supply of aluminum is derived from aluminum scrap. About one-seventh of our total copper supply is expected to come from old copper scrap alone.

✦ ✦ ✦

TO aid in solving these materials problems, your government has organized the Conservation Division to act under the guidance of the War Production Board, and has commissioned them with the responsibility of saving these and other critical materials at their source and of expediting the flow of waste materials promptly to the stream of production. The Conservation Division is split into four branches, each giving attention to its specialized responsibility. A brief description of these branches and the work they do, might clarify their purpose.

✦ ✦ ✦

THE **Conservation and Substitutions Branch,** as its name implies, watches the critical material list. They are working on all kinds of substitution problems. There is a defense plant now under construction with the major portion of its electrical equipment using silver to replace copper. When copper is again available this silver will be reclaimed and copper substituted for it. Plastic Insulation is now approved as insulation for building wire. They are working with several manufacturers of plastics, attempting to find an insulating material that will replace rubber on field wire for the Signal Corps.

✦ ✦ ✦

THE **Specifications Branch** works with the Specifications Offices of Government Departments, with a worthwhile objective. During normal times we have been accustomed to draw our specifications with a higher factor or permanence than is warranted at present. One business executive used this expression when advising me relative to the connection I might make with the war effort. "We have all lost our status of permanence during this scramble to re-establish world security." The same applies to the items of material we use daily. We should worry if our favorite soap contains a little less glycerin than it did, if we can know that that glycerin went into the manufacture of nitro-glycerin.

✦ ✦ ✦

THE **Simplification Branch** is eliminating the special items we are being asked to do without. The reduction of styles and colors in lamp bulbs from 3500 to 1700 different varieties is an example. The elimination of the soft light elements for fluorescent lamps will make available more beryllium, a much needed element. This is the much publicized group who did the simplification job on our clothing. The order on women's and children's clothing alone will save an estimated 100 million yards of wool, rayon, cotton and linen cloth, which are much needed items by every branch of the armed forces.

✦ ✦ ✦

THE **Salvage Branch** is responsible for the locating, collecting and moving of all waste and scrap material, thru the already established scrap dealer channels, back to the mills and furnaces for reprocessing. The work of this branch is so very broad that the responsibilities in it have been subdivided into four sections, each requiring a specialized approach. The work done by each branch is clearly defined in order that there be no overlapping of effort.

✦ ✦ ✦

THE **Special Projects section** handles large aggregations of scrap materials that are difficult to move because of financial, legal, political or other obstacles. In this category fall abandoned railroads and street railroad, bridges, mines and other idle and useless structures. This group is really doing a marvelous job against sometimes difficult obstacles.

✦ ✦ ✦

THE **General Salvage section** has probably received the most publicity of any of our group. They are the people who have sponsored the "Get in the Scrap" drives that have been so very well supported by our American people. In fact, one of their drives, waste paper, nearly upset the entire paper industry with its phenomenal success. To further the efforts of this

section, a state committee has been established in each of our 48 states, headed up by a voluntary chairman, a prominent citizen of the state, and an executive secretary. Under these state committees there are now serving 12,000 local committees with 130,000 members. I believe that the strongest testimony supporting the necessity for this work comes from the advertising campaign supporting these committees. ✦ ✦ ✦

I BELIEVE you will agree with me that, no one has more license to know the value and necessity of iron and steel scrap than the producers of steel. To meet the cost of conducting the iron and steel scrap campaign, including the necessary newspaper advertising, the steel companies have raised approximately one and a half million dollars. The glycerine producers and associated industries have raised half a million dollars to help persuade our wives to save waste kitchen fats. This is all the evidence necessary to convince me that that coffee can of grease in the ice box is actually a worthwhile gift to Mr. Hitler. It would be difficult to measure the success of this section. Reports from thousands of these committees could not be complete. We do know that they are doing a big job and that they have done it whole heartedly. ✦ ✦ ✦

THE Automobile Graveyard section has one of our biggest problems. The people see an automobile graveyard as a pile of scrap iron and steel that should be collected but apparently stands unmolested. Actually each car represents approximately 1700 pounds of iron and steel scrap and 70 pounds of non-ferrous metals. During the last six years 15,000,000 cars have been retired to these places, of which, prior to the formation of this section, 13,500,000 had moved on in the form of scrap, leaving approximately 1,500,000 cars still in the graveyard. Today there are only about 400,000 cars still in the graveyards. In the next 2½ years 15,000,000 cars will go out of service, and find their way to these collectors. We cannot eliminate dealers in junk cars. THEY perform a worthwhile service in the segregation of the vital materials contained in each car. They act as a source of supply to automobile repair men, now that the production of new parts has been curtailed. As a result of our efforts, these graveyards should show a complete turnover at least every 60 days, and many are working on a 30-day basis. There are isolated cases where requisitioning has been necessary, but on the whole voluntary cooperation has been excellent. The present program is designed to get more cars into the yards. ✦ ✦ ✦

THE Industrial Salvage section was organized and staffed to accomplish the very technical task of completing an industrial salvage job in industrial plants, and also to improve salvage methods used by various Governmental agencies and the War and Navy Departments. There are twelve regional offices located in industrial centers, Boston, New York, Philadelphia, Atlanta, Cleveland, Chicago, Kansas City, Dallas, Denver, San Francisco, Detroit, Minneapolis. Field Engineers from these various offices are working with industrial organizations in their regions. At Washington we have specialists who work with the heads of major industry. An example — A man who has spent many years in Railroad work is directly responsible for all railroad salvage work. A Chemical Engineer, who has for many years operated a private Consulting Engineering firm guides the work done with Chemical and Textile firms. My work is in the Public Utility field. We are operating with the full support of the American Institute of Electrical Engineers and the Edison Electric Institute and other trade associations. ✦ ✦ ✦

EITHER my Associate or I expect to attend most if not all of the sectional meetings of the American Institute of Electrical Engineers, the seventy-one of which will hold meetings this fall, to discuss with them our mutual problems in this Industrial Scrap program. We are indeed grateful for the opportunity to attend these meetings. PUBLIC Utilities and Wire are generally considered synonymous. When I started to prepare this talk I thought so too, but when I learned of the industrial scope to be represented here I changed my mind. Rather than suggest to you what you can do as the Wire Industry's Part in Industrial Salvage, I might better ask you what we can do to assist the Wire Industries Part in Industrial Salvage. ✦ ✦ ✦

I HAVE not mentioned previously the real meaning of this work as I see it. I believe that it starts back of the actual promotion of movement of scrap back to the mills. The wire industrialists are, I expect, as anxious to reduce the scrap which must be worked over in their own mill, as we are, since the percentage of scrap plays a large part in production costs. We know that this material is constantly in motion and we give it no thought. The idle piece of machinery does give us plenty of worry however. In every mill in our land there is idle equipment that can be worn out or outmoded in which case the mill owners are better off without it. It may be broken in which case it should either be repaired or sold to a scrap dealer. ✦ ✦ ✦

IT may be usable to some other manufacturer who needs it badly but cannot get delivery on a new one, in which case it should be listed with the **Surplus Used Equipment Division,** of the **War Production Board.** In the last and most difficult of all categories to account for properly, will be found the equipment that was in service during peace time and, either probably will, or possibly will, be used after the collapse of Mr. Hitler. We hesitate at present to ask you to scrap these machines. You must be the judges on this equipment. If you are sure you will use it after the war, put it away, at least until the need for scrap becomes more acute. If it was used to make something that has been outmoded by the advances we have made, possibly you would be as well off without it. I presume that in every industry, production pressure, under which we have been working, has found manufacturing methods

that will replace those in practice before the war. This should help us decide what machinery we can afford to scrap. An excellent instance of this point, of which there must be hundreds, is the case of one company, which for many years had been making a small copper item involving a tube and a collar, in two parts. A better article than the old one is now a one piece item made by one stroke of an impact extrusion press. This company will never go back to the old two piece item. Possibly the old machinery could be made into an anti-aircraft gun to be used to protect their factory, more advantageously than it could be stored until after the war and then adapted to make some other item.

✦ ✦ ✦

THE same principal holds true in items of material. Every old bolt that is cleaned up and reused, in a place essential to the War Effort, is one bolt for which we will not have to find the steel or the machine to make a new bolt, or the place to put the machine, the man to operate it, the box in which to pack it, or the freight car in which to ship it. In my particular branch, **Public Utilities**, we are doing repair work on cable that would have been ridiculous two years ago. Who would have thought that 100 foot lengths of overhead line wire would be worth the sleeves with which to splice it. Today the Electric Operating Utilities are splicing 50 foot sections and shorter. In the case of solid wire, 50 foot sections are being butt welded and redrawn for hardening. For many years it has been common practice, when taking down an over head line, to cut the anchor rod off a foot or so underground and leave it. The labor cost of digging it up is greater than the cost of a new anchor. Now, when a line is abandoned, the anchor is salvaged. When a lineman can remember where he cut one off a few years back, that one is also salvaged. Rusted parts are cleaned and painted with one of the new paints recently developed as a preservative covering to replace zinc used in galvanizing. The salvaging of insulating material has brought out many new problems. One of the most difficult is the removal of rubber from small gauge wire. One salvage company alone collects, every month, a half million pounds of telephone drop wire consisting of a pair of 17 or 18 gauge copper wires, each insulated with rubber, and the pair covered with an impregnated braid.

✦ ✦ ✦

THE only method so far known of removing this braid and rubber, in order to salvage the copper, is to burn it off. 200,000 pounds of rubber goes up in smoke, every month, as long as this burning method is used. This wire is now being held until someone works out a method of removing this rubber. I believe that the separation of the braid from the rubber would not be difficult. They could probably be separated by a floating process. These are merely sketchy examples of what is being done in other places. You men who are involved in the wire industry know far better what can be done than anyone not directly involved in that industry. Our part of your program of salvage is quite clearly cut out. We can only be your servant. We solicit requests to assist you in any way possible.

✦ ✦ ✦

WE would like to see you set up, in your individual organizations, the necessary machinery for the expediting of a salvage program. We suggest a Four Point program.

✦ ✦ ✦

FIRST put some one individual in charge of salvage in every department of your organization and GIVE HIM AUTHORITY TO ACT.

✦ ✦ ✦

SECOND devise an EFFECTIVE method of bringing the message of conservation to ALL of your employees.

✦ ✦ ✦

THIRD build into your program a plan to keep it alive. Don't let initial enthusiasm die.

✦ ✦ ✦

FOURTH and by no means the least important, ACT NOW.

✦ ✦ ✦

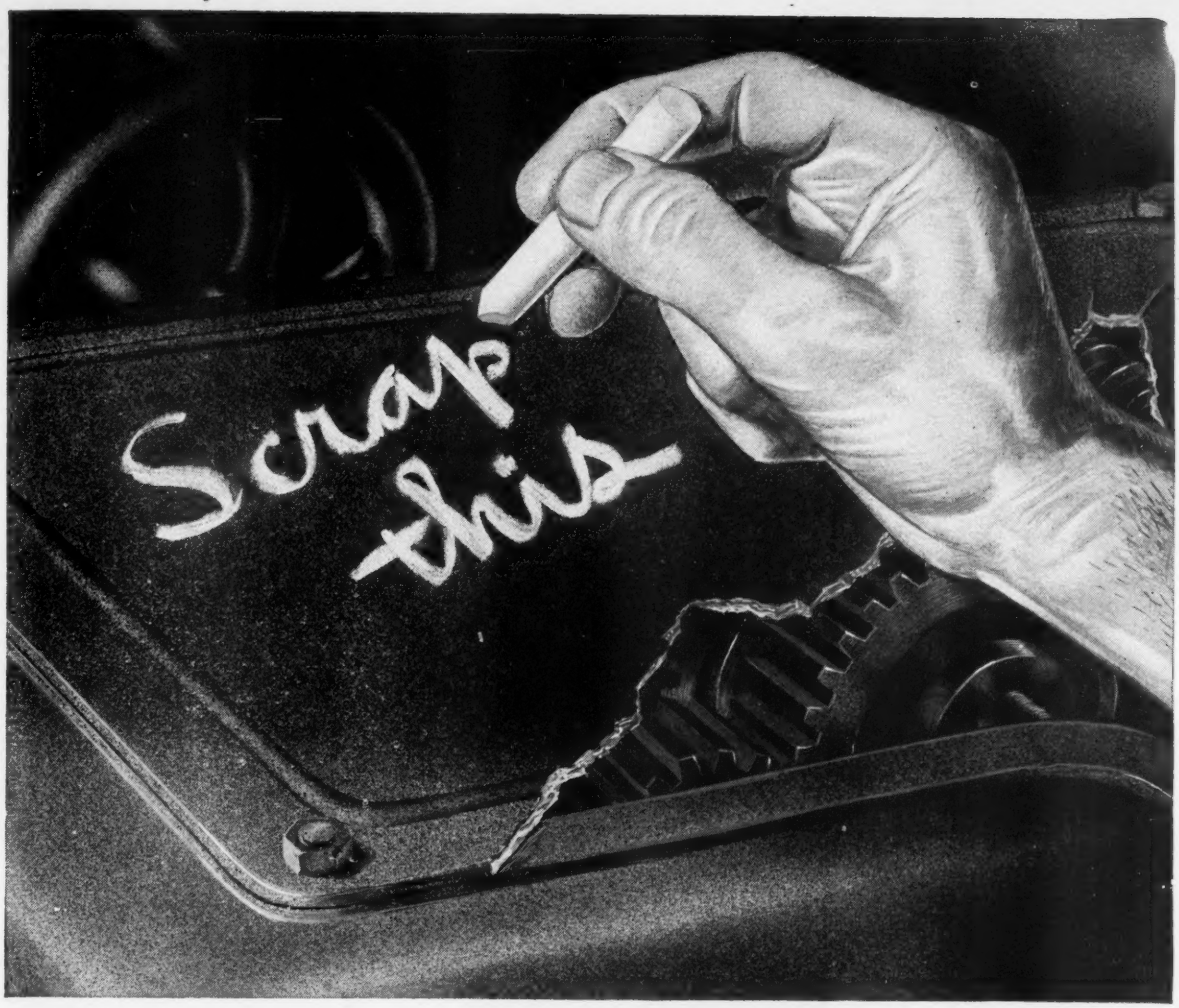
MAY I repeat that, the person who heads up your salvage program should have full authority to act on his own initiative. It is expected that the disposal of some machinery will require Executive action but in the majority of instances, he should be some one qualified to make decisions and then be allowed to do so. Referring to the second of these points, the **Industrial Salvage Section** at Washington has posters and literature, both of which we will be glad to supply, to help you spread the campaign. If you wish to have an employee's mass meeting we will be glad to supply a speaker, either from Washington or from the regional office. Arrangements for this assistance should be made thru the Washington office.

✦ ✦ ✦

THIS brings me to a matter that may seen trivial and possibly even distasteful. Reports. We realize the voluminous nature of the reports with which you people are being asked to deluge the City of Washington. It is a deluge, in many cases, and you can rest assured that the people in Washington, who use those reports deplore their necessity as much as you do. To go just as far as possible in eliminating the disagreeable part of this program we have held down the requirements of reports to an absolute minimum. We have had printed some small self addressed cards that we ask to have filled out and mailed, one each month. They give only the name of the Company reporting, the approximate tonnage of material sold, divided only generally, such as iron and steel, non-ferrous metals, rubber, etc. and the name of the dealer to whom you sold this material. We have a reason for requesting these reports.

✦ ✦ ✦

THIS program is worth while, it is interesting. It is a way that the fellow down on the line can get into the war effort personally. It has been gratifying to us to watch the enthusiastic way that industry has attacked this salvage program. It will please you to watch your employees enter into the salvage spirit. The tonnage of material you will find will amaze you, but, whether it be the raising of the Normandie or the straightening of a crooked nail, it is salvage, a program that gives each and every American an opportunity to Get in the Scrap.



THE HAND IN YOUR PLANT THAT STEEL WORKERS WANT TO SHAKE

— is the hand that chalks "scrap this" on every obsolete machine—on every piece of idle equipment, and starts them on their way to the steel furnaces to be made into fighting steel. Appoint some one in your plant—with knowledge and authority—to scrap every old-time machine and every piece of equipment not working for you *now.* This scrap is needed for making high quality steels for shells, bombs, guns, tanks, planes, and ships.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH, PENNSYLVANIA

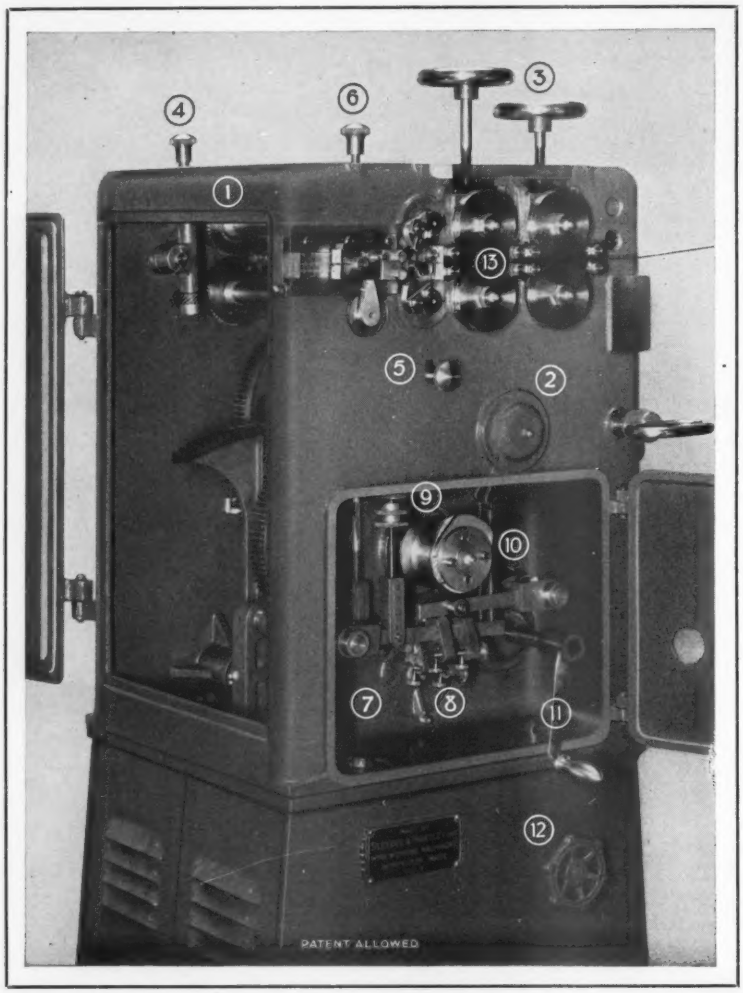
PARTNER TO INDUSTRY IN WAR PRODUCTION

J&L STEEL

13 Points of Superiority

in

No. 1 Universal Spring Coiler



1- One piece cast iron housing for rigidity and perfect alignment.

2- Ball Bearing construction throughout on all rotating shafts.

3- **Convenient Controls—** Individual pressure control for each pair feed rolls.

4- Individual simple adjustment for cutter alignment, easily adjusted from upper to lower cutter.

5- Pitch and

6- Diameter control readily accessible.

7- Pitch and Diameter Cam control located in recess in front housing.

8- Rapid and micrometer adjustment of compound blocks facilitates set-up time.

9- Pitch stop conveniently located and quickly adjusted.

10- Combination cam hub for pitch and diameter cams, completely removable from machine.

Both pitch and diameter cams may be shaped and timed on the cam hub for special springs and the entire unit removed from the machine, thus reducing set-up time. Additional cams and hubs can be applied for this purpose.

One piece solid cams can be used on this removable cam hub.

11- Removable ratchet-type crank for set-up purposes only. Removed during operation.

12- Motor or Pulley Drive as required with variable Speed Transmission for production range if desired.

13- Tooling interchangeable with previous Sleeper & Hartley models.

No. 1 Universal Spring Coiler

Segment Type

48" Model *Series 666*

Wire Range .018" to .080"

INCREASED CAPACITY

Compound gearing for 96" feed if desired.

Other Improved Features—

Morse Free Wheeling Clutch for high-speed accuracy. Morse Free Wheeling Recoil Clutch, as extra equipment, if desired.

Single cutter operation.

Wear free diameter slide connection.

SLEEPER & HARTLEY, Incorporated

DESIGNERS AND BUILDERS

Worcester, Massachusetts, U. S. A.

Relaxation Resistance of Nickel-Alloy Springs

By B. B. Betty,[1] E. C. MacQueen,[2] and Carl Rolle[3]

As a result of a series of tests reported in this paper, stresses required to produce 2, 4, and 6 per cent load loss, or relaxation, in coil springs, held at constant height and constant temperature, have been determined by the authors for several alloys, namely, Monel,[4] "K"[4] Monel, "Z"[4] nickel, and Inconel.[4] Successive test temperatures from 300F to 700F were used. The range of temperature over which these several alloys can be used successfully, when load loss is a criterion, has been determined. "K" Monel, "Z" nickel, and Inconel have been found to be comparable, in this respect, to high-alloy spring steels, while Monel is more nearly comparable to low-alloy steels. ✦ ✦

INASMUCH as the high-nickel alloys retain their strength to a considerable degree at elevated temperatures and resist oxidation and corrosion as well, they have been useful in many elevated-temperature spring applications. Unfortunately, quantitative data have been lacking on the extent to which coil springs of these materials would retain their load-carrying capacities. As a result of this situation, and in cooperation with the A.S.M.E. Special Research Committee on Mechanical Springs, the authors have undertaken to supply accurate laboratory data for Monel, "K" Monel, "Z" nickel, and Inconel.

✦ ✦ ✦

THROUGHOUT this discourse the term "relaxation" will be used to denote load loss occurring, at constant height, in closely coiled helical compression springs. In this case elastic strain in the outer fibers of the wire, produced by the external load on the spring, is converted gradually to plastic strain, or permanent set. The amount of elastic, or recoverable strain is thereby reduced and there is a proportionate reduction in the load supported by the spring. The percentage loss from the original load is expressed as "per cent load loss" or "per cent relaxation."

[1]Huntington Works Laboratory, The International Nickel Company, Inc., Huntington, W. Va. Mem. A.S.M.E.
[2]Huntington Works Laboratory, The International Nickel Company, Inc., Huntington, W. Va.
[3]Development and Research Division, The International Nickel Company, Inc., New York, N. Y. Mem. A.S.M.E.
[4]Registered United States Patent Office.
[5]Numbers in parentheses refer to the Bibliography at the end of the paper.
Contributed by the Special Research Committee on Mechanical Springs for presentation at the Annual Meeting, New York, N. Y., December 1-5, 1941, of The American Society of Mechanical Engineers.
Note: Statements and opinions advanced in papers are to be understood as individual expressions of their authors and not those of the Society.

Published by permission of The American Society of Mechanical Engineers.

THE data and conclusions presented herein are based upon tests of springs loaded to a constant height. However, many applications involve the use of springs at constant load rather than constant height. It is felt that, within stress and temperature limits which would produce not more than about 10 per cent relaxation, these data could be applied to cases of constant-load service also. **McKeown** (1)[5] has discussed the case in which springs are subject to creep deformation under constant load at elevated temperatures.

✦ ✦ ✦

SOME previous load-loss data for Monel have been published in a paper by **Zimmerli, Wood,** and **Wilson** (2). The results of an outstanding experimental investigation of load loss, involving approximately 120,000 test springs, have been presented recently to this Society by **Zimmerli** (3).

Description of Test Springs

THE springs tested were 1¼ in. OD, 2¾ in. free height and had 6¼ total coils and 4¼ active coils. The 0.148-in-diam wire was produced and cold-drawn by the Huntington, W. Va., works of the authors' company. Table 1 gives the chemical analyses of the various alloys and metals investigated. The specimens were coiled by the Barnes-Gibson-Raymond Division of the Associated Spring Corporation. After coiling, ends were ground flat for 270 deg.

✦ ✦ ✦

ALL springs were given a thermal treatment before being tested. The two solid-solution alloys, Monel and Inconel, were given appropriate low-temperature stress-equalizing anneals, while the precipitation-hardenable alloys, "K" Monel and "Z" nickel, were heat-treated to take full advantage of that property. In the latter cases, the hardness and general mechanical properties produced in the wire by cold-drawing are augmented appreciably by the heat-treatment component.

✦ ✦ ✦

ON completion of a series of preliminary tests, it was found that optimum resistance to relaxation was produced in Monel by a 650 F stress-equalizing anneal for 1 hr, and in Inconel by a 900 F anneal for 1 hr. Further discussion of these tests will be given in Appendix 1. These stress-equalizing treatments were used on all Monel and Inconel springs involved in the main investigation.

✦ ✦ ✦

ALL "K" Monel springs were given a heat-treatment of 1000 F for 6 hr, followed by 900 F for 16 hr. All "Z" nickel springs were aged at 900 F for 6 hr.

TABLE 1 — CHEMICAL COMPOSITION, PER CENT

Material	Melt	C	Mn	Fe	S	Si	Cu	Ni	Al	Cr
Monel	M-4555-B	0.18	0.94	1.24	0.007	0.10	28.46	69.02	..	...
"K" Monel	M-1050-K	0.18	0.12	0.25	0.005	0.20	29.69	66.10	2.92	...
"Z" nickel	N-6840-Z		0.05	0.14	0.005	0.14	0.03	98.61	..	..
Inconel	NX-3530	0.06	0.16	5.77	0.010	0.22	0.04	80.65	..	13.07

TABLE 2 — MECHANICAL PROPERTIES

Material	Per cent cold reduction	Heat-treatment	Tensile properties: Tensile strength, psi	Tensile properties: Elongation in 2 in., per cent	Tensile properties: Reduction of area, per cent	Torsional properties: Proportional limit, psi	Torsional properties: Breaking strength, psi	Torsional properties: Total twist in 10 in., turns	Hardness VHN, 10 kg.
Monel	75	None	157000[a]	5[a]	59[a]	67800[a]	110000[a]	93[b]	284
		650 F-1 hr.	160000[b]	10[b]	56[b]	64700[a]	104900[a]	95[b]	309
"K" Monel	50	None	163000[a]	3[a]	40[a]	68000[a]	107000[a]	18[b]	287
		1000 F-6 hr, 900 F-16 hr	197000[b]	7[b]	28[b]	74600[a]	137200[a]	7[b]	380
"Z" nickel	50	None	175000[a]	4[a]	40[a]	71000[a]	127000[a]	74[b]	330
		900 F-6 hr	225000[b]	10[b]	20[b]	76200[a]	159700[a]	10[b]	450
Inconel	65	None	172000[a]	4[a]	47[a]	74000[a]	115000[a]	37[b]	317
		900 F-1 hr	188000[b]	8[b]	47[b]	66600[a]	123900[a]	75[b]	366

[a] Average of two specimens.
[b] Average of five specimens.

THE influences of these thermal treatments upon the mechanical properties of the materials may be observed by inspection of Table 2. The data in this table were determined from wire samples which were given the same respective treatments as the coiled test springs.

✦ ✦ ✦

CARE was taken not to compress the springs beyond the height used during the test, thus the specimens received no benefit from cold-working prior to testing. Springs generally would be pressed solid as a manufacturing operation, but this operation was omitted since it is not universally used in practice. Actually some of the stresses used in testing were in excess of the elastic limit of the wire. However, in such cases any immediate relaxation taken by the spring automatically was included in the relaxation reported in this paper. The reason for this is that, as covered later under "Test Conditions and Procedure," the springs were loaded to the test height and then held there without making any allowance for set which may have taken place.

✦ ✦ ✦

Test Conditions and Procedure

A SECOND preliminary series of experiments was run to determine the necessary duration of exposure to insure that practically all the relaxation had occurred. It was found that a 7-day period was appropriate. Figs. 30 and 31, showing relaxation of Monel and Inconel, subjected to various stress-equalizing treatments, show also that there is no consistent difference in per cent relaxation experienced during 7-day and 10-day tests under identical conditions.

✦ ✦ ✦

AS a result of these observations it was decided to employ a 7-day testing period for all springs used in the main investigation.

✦ ✦ ✦

IN the performance of these relaxation tests, the loads required to produce the desired stresses in the springs were first calculated. These calculated loads were applied to the springs in a weighing attachment mounted upon a Toledo scale, the sensitivity of which was 1 oz. The loaded length of each spring was measured to 0.001 in. by a caliper and micrometer. The spring then was compressed to the measured loaded length and held firmly to that length upon a special bolt and nut. The bolt was of 7/8-in-diam Monel, so that no creep could be expected to occur in it during the course of the test. Washers, larger than the outside diameter of the test spring, were welded to the head of the bolt and to the nut. The faces of these washers were machined flat and parallel to facilitate length measurements.

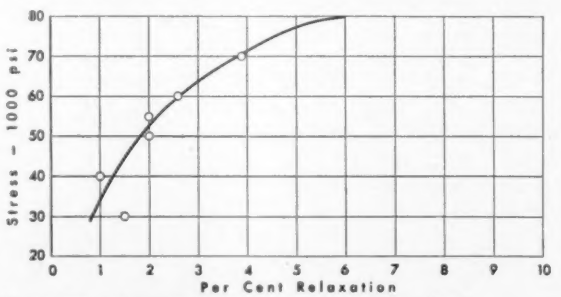


Fig. 1. Stress Versus Relaxation in 7 Days; Monel at 300 F. ✦

✦ ✦ ✦

THE assembled bolts, nuts, and springs were placed inside a nickel box and into an electrically heated oven for the heating period. Sixty springs were tested simultaneously. A temperature uniformity of 3 F was observed to exist throughout the box, and temperature control within 5 F was maintained during each heating period.

✦ ✦ ✦

AFTER the 7-day heating period, the springs were removed from the furnace and cooled in air. After removal of the holding bolts, the springs were compressed to the original loaded length in the spring-weighing machine. The load supported after test

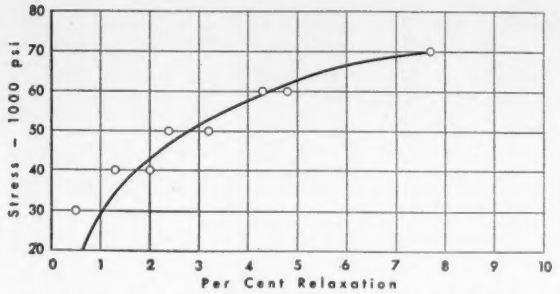


Fig. 2. Stress Versus Relaxation in 7 Days; Monel at 400 F.

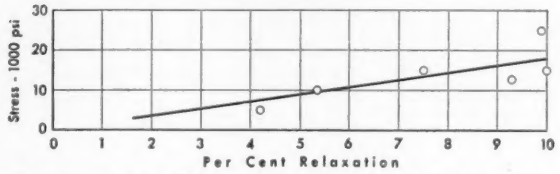


Fig. 4. Stress Versus Relaxation in 7 Days; Monel at 500 F.

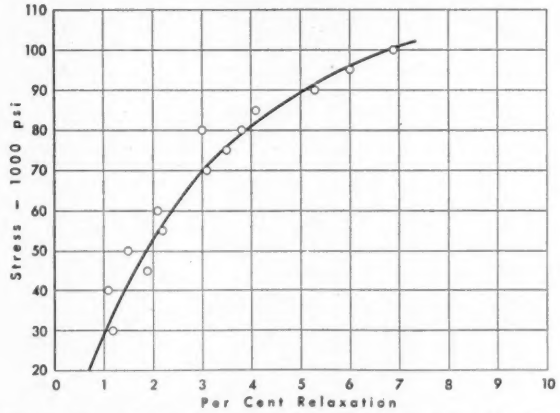


Fig. 6. Stress Versus Relaxation in 7 Days; "K" Monel at 450 F.

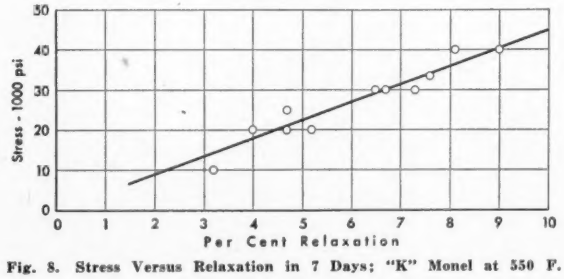


Fig. 8. Stress Versus Relaxation in 7 Days; "K" Monel at 550 F.

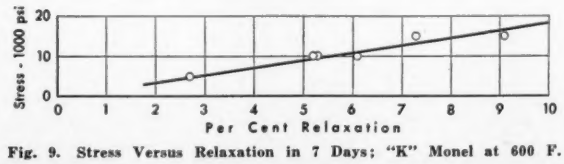


Fig. 9. Stress Versus Relaxation in 7 Days; "K" Monel at 600 F.

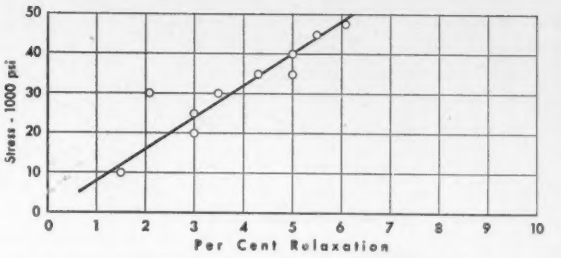


Fig. 3. Stress Versus Relaxation in 7 Days; Monel at 450 F.

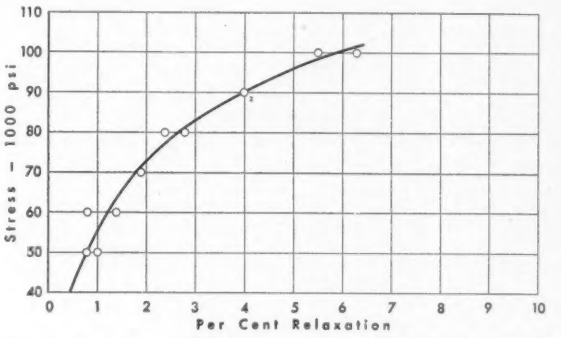


Fig. 5. Stress Versus Relaxation in 7 Days; "K" Monel at 400 F.

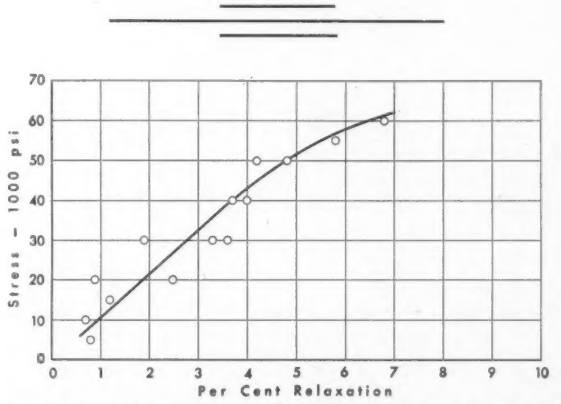


Fig. 7. Stress Versus Relaxation in 7 Days; "K" Monel at 500 F.

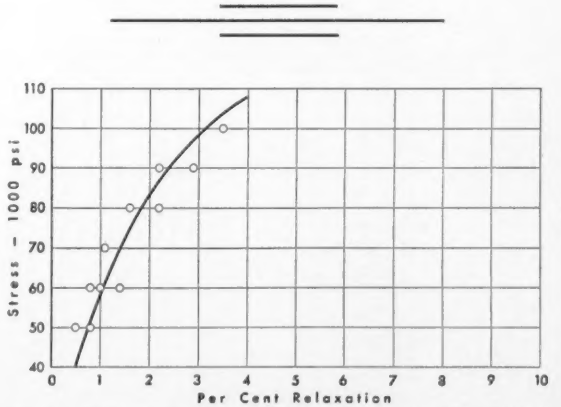


Fig. 10. Stress Versus Relaxation in 7 Days; "Z" Nickel at 400 F.

was measured. The difference between the originally applied load and the load the spring supported after the heating period is the basis of the "load-loss" calculation.

✦ ✦ ✦

Load and Stress Calculations

THE loads applied to the springs, in order to impose the desired arbitrarily chosen values of maximum fiber stress, were calculated by the use of the formula

$$P_t = \frac{S_t \pi d^3}{8DK} \quad \text{[1]}$$

where

P_t = load at test temperature, lb
S_t = maximum fiber stress at test temperature, psi
d = wire diameter, in.
D = mean coil diameter, in.
$c = \frac{D}{d}$
K = stress-correction factor, developed by **A. M. Wahl** (4)
$= \left(\frac{4c-1}{4c-4} + \frac{0.615}{c}\right)$

ALL maximum fiber stresses stated in connection with the results of this investigation are those prevailing at the test temperature. In order to convert values of P_t into load required for the same deflection at room temperature, a correction was applied for the change in torsional modulus of elasticity. The change in modulus, from room temperature to test temperature, produces a proportionate change in the calibration rate of the spring.

✦ ✦ ✦

TO effect this correction, therefore, the load obtained from Equation [1] was converted to room-temperature load by the formula

$$P_r = P_t \frac{G_r}{G_t} \quad \text{[2]}$$

where

P_r = load at room temperature, lb
G_r = torsional modulus at room temperature, psi
G_t = torsional modulus at test temperature, psi

THE value obtained for P_r was used in the initial loading of each spring.

✦ ✦ ✦

A DISCUSSION of the method used for obtaining values of G_r and G_t is given in Appendix 2.

✦ ✦ ✦

IT should be noted that **Zimmerli** (3) stated his results in terms of stress on the spring at room temperature, although the method for adjusting these values was outlined. The correction used in this investigation results in reported stress values which are lower, for any given design and deflection, than if the correction had not been applied.

✦ ✦ ✦

NO attempt was made to correct the data for changes in the length of the springs and bolts due to thermal expansion. The maximum error involved occurs in the testing of Inconel at 700 F and in this case the difference between the computed expansions of the spring and the Monel bolt is only 0.0007 in. per in.; less than the

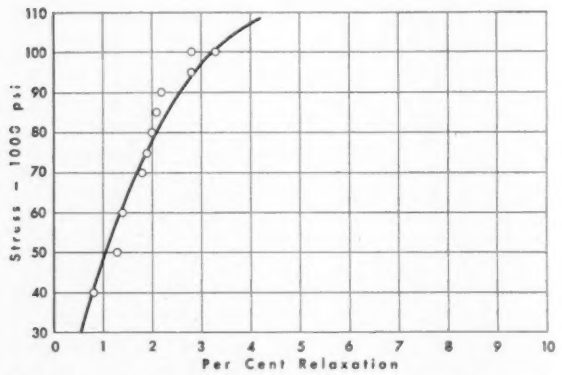


Fig. 11. Stress Versus Relaxation in 7 Days; "Z" Nickel at 450 F.

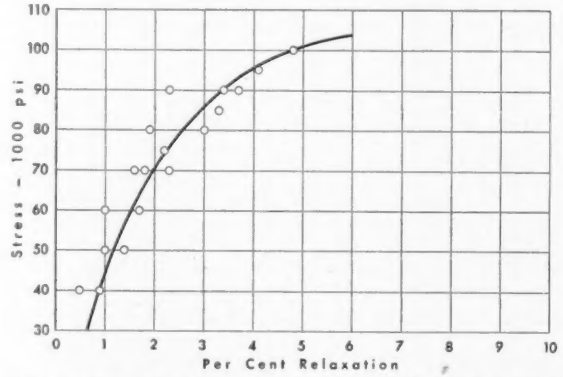


Fig. 12. Stress Versus Relaxation in 7 Days; "Z" Nickel at 500 F.

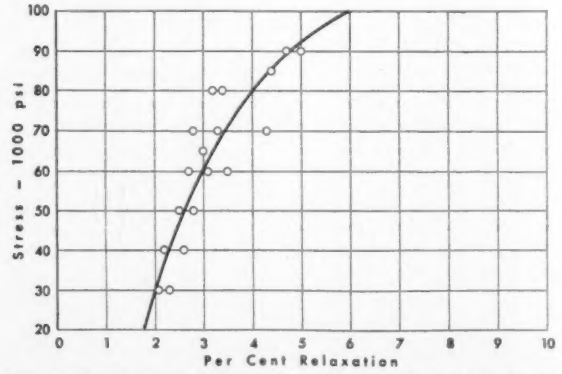


Fig. 13. Stress Versus Relaxation in 7 Days; "Z" Nickel at 550 F.

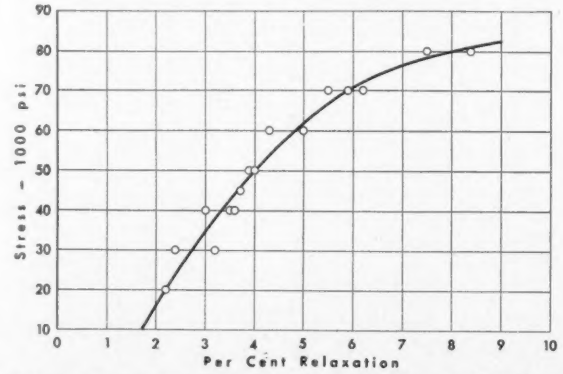


Fig. 14. Stress Versus Relaxation in 7 Days; "Z" Nickel at 600 F.

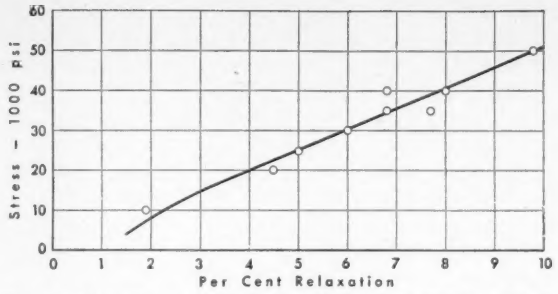


Fig. 15. Stress Versus Relaxation in 7 Days; "Z" Nickel at 650 F.

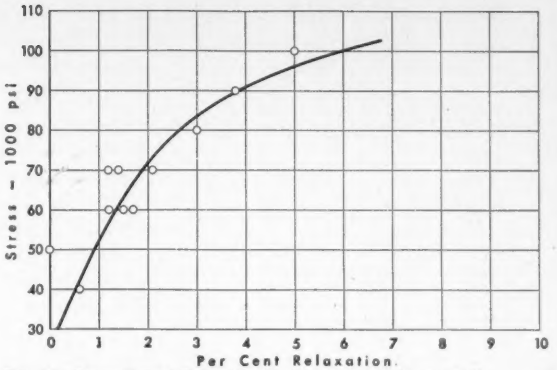


Fig. 16. Stress Versus Relaxation in 7 Days; Inconel at 400 F. ✦

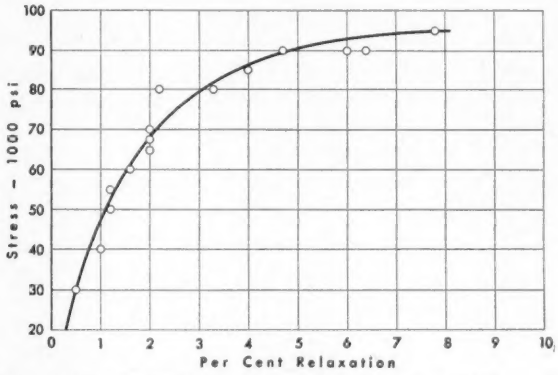


Fig. 17. Stress Versus Relaxation in 7 Days; Inconel at 450 F. ✦

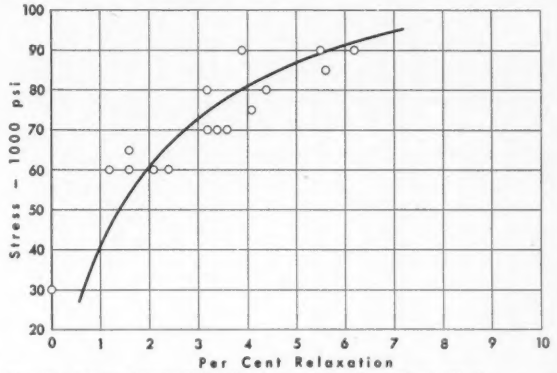


Fig. 18. Stress Versus Relaxation in 7 Days; Inconel at 500 F. ✦

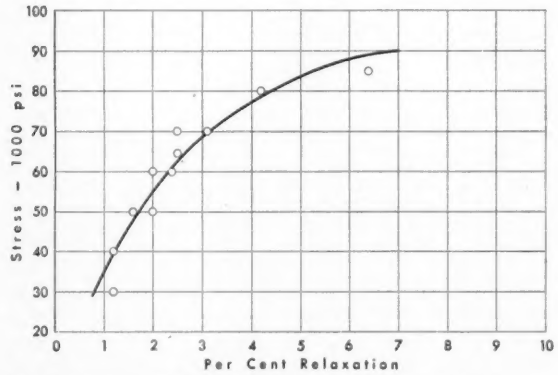


Fig. 19. Stress Versus Relaxation in 7 Days; Inconel at 550 F. ✦

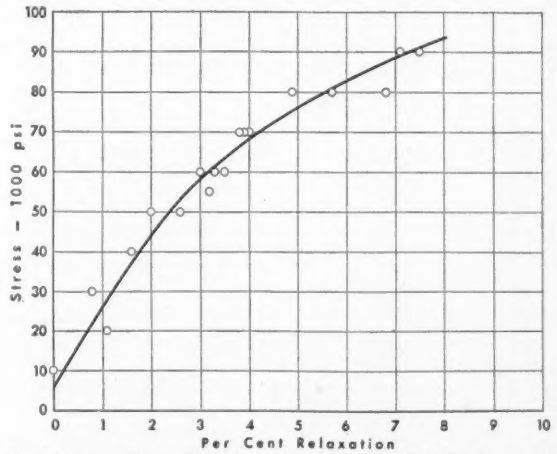


Fig. 20. Stress Versus Relaxation in 7 Days; Inconel at 600 F. ✦

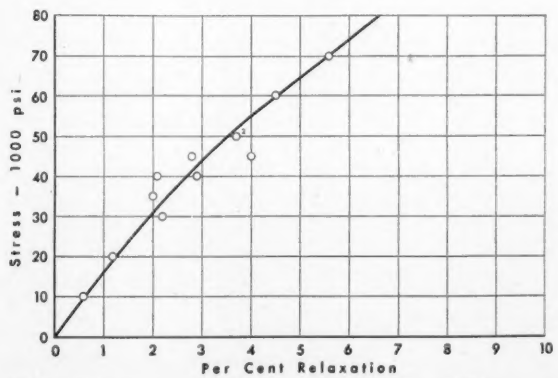


Fig. 21. Stress Versus Relaxation in 7 Days; Inconel at 650 F. ✦

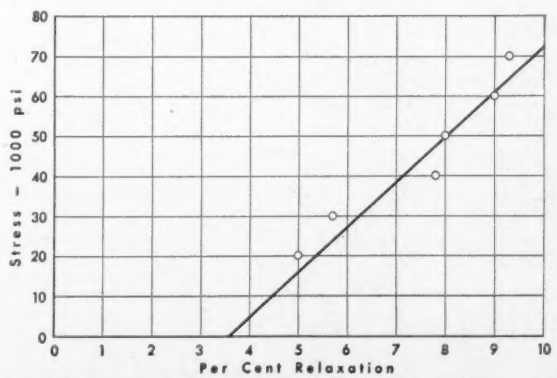


Fig. 22. Stress Versus Relaxation in 7 Days; Inconel at 700 F. ✦

TABLE 3 — INDICATED MAXIMUM FIBER STRESS TO PRODUCE GIVEN PERCENTAGES OF RELAXATION

(Stress in 1000 psi)

Temperature, F	Monel			"K" Monel			"Z" nickel			Inconel		
	2 Per cent	4 Per cent	6 Per cent	2 Per cent	4 Per cent	6 Per cent	2 Per cent	4 Per cent	6 Per cent	2 Per cent	4 Per cent	6 Per cent
300	52.5	70.5	80.0	..	..	..	..	..	..	..	..	..
400	43.0	57.5	65.5	73.0	90.0	100.5	83.0	108.0	..	72.0	91.0	100.0
450	16.0	32.5	48.0	53.0	81.0	96.0	78.0	107.0	..	68.0	86.5	93.0
500	4.0	7.5	11.0	21.5	43.0	58.0	70.0	95.5	104.0	61.0	81.0	91.5
550	..	..	..	9.0	18.0	27.0	30.0	80.0	100.0	55.0	77.0	88.0
600	..	..	..	3.5	7.0	11.0	16.0	50.0	71.0	44.0	68.0	83.0
650	..	..	..	..	..	..	8.0	20.0	30.5	31.0	55.0	74.0
700	..	..	..	..	..	..	..	..	..	..	4.5	27.0

probable accuracy of measurement.

✦ ✦ ✦

Discussion of Results

THE experimental values of per cent relaxation from given initial stresses at various test temperatures are plotted in Figs. 1 to 22, inclusive. These figures represent the results, respectively, for Monel at 300 to 500 F; "K" Monel at 400 to 600 F; "Z" nickel at 400 to 650 F; and Inconel at 400 to 700 F.

✦ ✦ ✦

EACH test point plotted represents the average value observed for a set of three springs. The notation "2" which appears beside some points indicates that the averages for two independently tested sets fell at the same point. In drawing the curves through the test points, due consideration was given to the data obtained for the same material at temperatures immediately above and below that of the curve in question, so that a consistent family would be obtained if all curves for one material were assembled on a single sheet.

✦ ✦ ✦

THIS group of charts indicates that even after averaging together the results on a set of three springs there exists a fair degree of scatter in the data. In many cases a single determination would be sufficiently inconsistent to "throw off" the average of three. The data are plotted in this manner, using a separate chart for each curve, so that the degree of scatter might readily be observed and considered. It will be noted that the curves were drawn so as best to represent the entire group of data rather than to encompass the extreme points of low stress or high per cent relaxation.

✦ ✦ ✦

IN adapting these data to practical design, therefore, due consideration should be given to the scatter of results.

✦ ✦ ✦

COMPILED in Table 3 are the stresses required to produce 2, 4, and 6 per cent relaxation in the 7-day testing period, as obtained from the curves in the previous figures. It was not possible to determine, with any degree of accuracy, similar data for 0 per cent relaxation.

✦ ✦ ✦

IN Fig. 23, the stress values required to produce 2, 4, and 6 per cent relaxation in Monel springs are plotted against test temperature. Figs. 24, 25, and 26 are similar figures in which are plotted corresponding data for "K" Monel, "Z" nickel, and Inconel, respectively. This set of charts illustrates the fact that much higher working stresses may be used for any of these alloys when slightly higher percentages of relaxation or load loss are permissible.

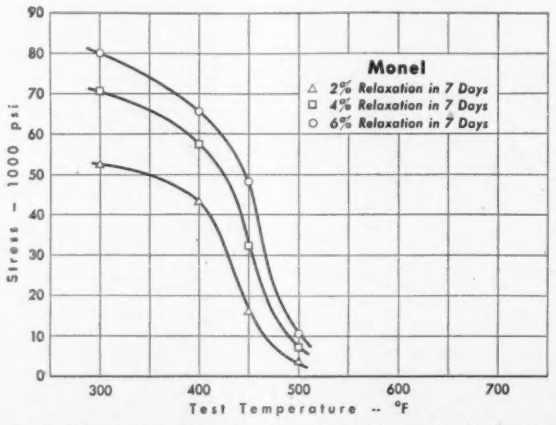


Fig. 23. Stress Required to Produce 2, 4, and 6 Per Cent Relaxation of Monel Springs in 7 Days.

✦ ✦ ✦ ✦

✦ ✦ ✦

BY inspecting the respective values for torsional proportional limit given in Table 2, it will be noted that these values are exceeded considerably by the stresses required to produce only 2 per cent load loss at the lower temperatures. This follows the characteristic behavior of these alloys in that, when the proportional limit is exceeded, a sudden yielding does not take place. Instead, there is a considerable increase in load-carrying capacity with only a relatively small degree of permanent set.

✦ ✦ ✦

THE degree of flatness of the stress-temperature curve for any given percentage relaxation is, of course, governed by the degree to which each material retains its room-temperature properties at elevated temperatures.

✦ ✦ ✦

FIG. 27 is a chart showing the stress required to produce 2 per cent relaxation plotted against test temperature for all the alloys discussed, while Figs. 28 and 29 are drawn in a similar manner to show 4 and 6 per cent relaxation, respectively. These figures illustrate the relative positions of the several alloys studied with respect to the stress and temperature scales.

IT is evident that, at temperatures up to about 400 F and where severe stress conditions must be met, "K" Monel or "Z" nickel would be the choice, with "Z" nickel maintaining a preferred position up to about 550 F. At higher temperatures, however, where somewhat lower stresses would be necessary, Inconel would be preferable. Monel appears to be useful only up to about 400 F and then only at moderate stress levels.

✦ ✦ ✦

IN applying these data to design, the size and strength of the wire used in making the test springs should be borne in mind. While the tensile properties were typical of those obtained in 0.148-in-diam wires of these alloys, they cannot be assumed as minima. Furthermore, these materials, especially Monel and Inconel, show lower tensile strengths for larger diameters; hence, for any specific design problem, the wire size also should be considered. However, the data presented herein should be representative for all wire diameters up to about 0.148 in.

✦ ✦ ✦

Conclusions

1. Inconel resists relaxation up to high temperatures and may be used at high stresses up to 650 F. Above this temperature the stress must be lowered considerably and a slight degree of relaxation must be tolerated.

2. "Z" nickel and "K" Monel will withstand higher stresses than Inconel at the lower temperatures, consistent with their generally higher level of mechanical properties.

3. "Z" nickel may be used with high stress at temperatures up to 550 F and with reduced stress up to 600 F.

4. "K" Monel may be used with high stress up to 450 F and with reduced stress up to 500 F.

5. Where other factors such as corrosion resistance are involved, Monel offers possibilities as a

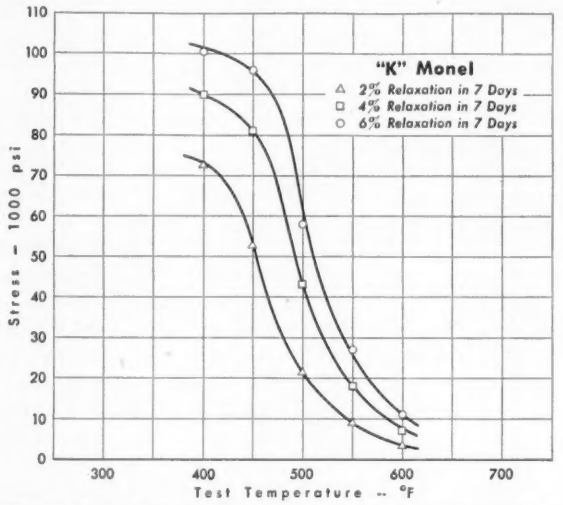


Fig. 24. Stress Required to Produce 2, 4, and 6 Per Cent Relaxation of "K" Monel Springs in 7 Days. ✦ ✦ ✦ ✦

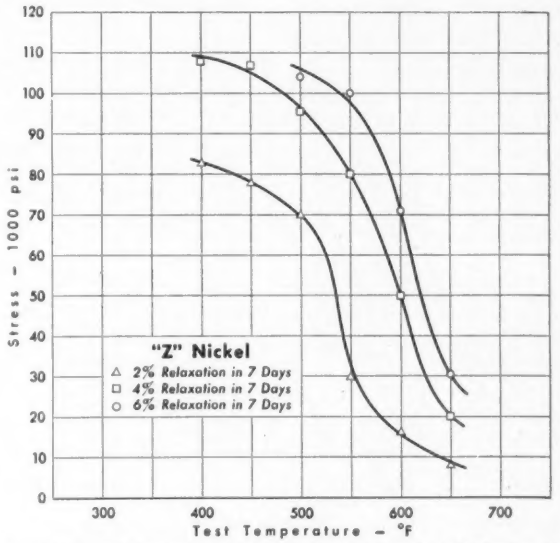


Fig. 25. Stress Required to Produce 2, 4, and 6 Per Cent Relaxation of "Z" Nickel Springs in 7 Days. ✦ ✦ ✦ ✦

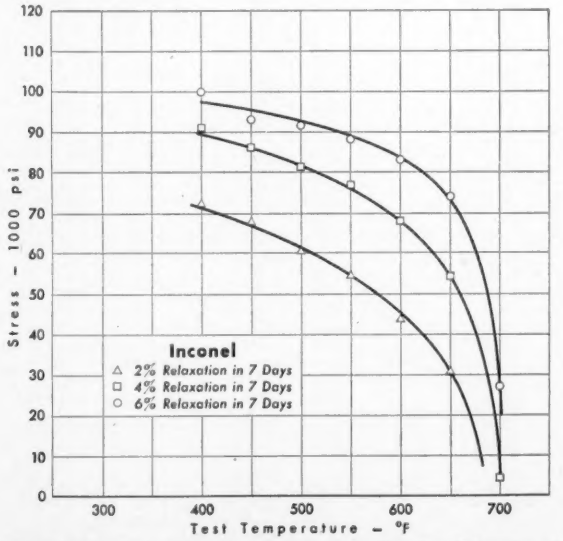


Fig. 26. Stress Required to Produce 2, 4, and 6 Per Cent Relaxation of Inconel Springs in 7 Days. ✦ ✦ ✦ ✦

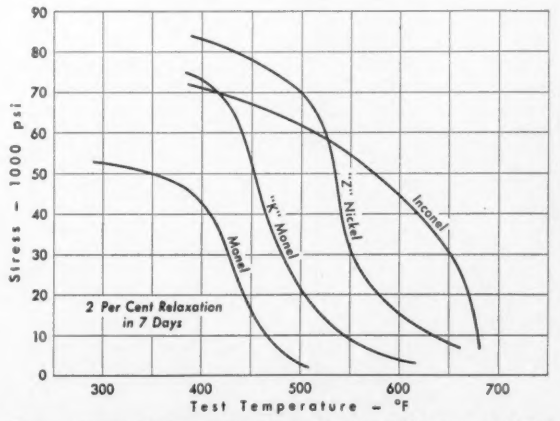


Fig. 27. Stress Required to Produce 2 Per Cent Relaxation of Monel, "K" Monel, "Z" Nickel, and Inconel Springs in 7 Days. ✦

spring material for temperatures up to about 400 F and at moderate stress levels.

6. Monel springs should be stress-equalized for 1 hr at 650 F where relaxation resistance is desired.

7. Inconel springs should be stress-equalized for 1 hr at 900 F for service at elevated temperatures.

✦ ✦ ✦

Appendix 1
Optimum Stress-Equalizing Treatments

SEVERAL series of tests at various stress levels and at various test temperatures were carried out on Monel and Inconel springs for the purpose of determining the optimum stress-equalizing treatments.

✦ ✦ ✦

FIG. 30 shows the results of a typical series for Monel under test conditions of 40,000-psi stress, and 400 F. Each test point represents the average relaxation value for three springs. Tests were conducted for both 7 days' and 10 days' duration.

✦ ✦ ✦

FIG. 31 shows the results of a similar series for Inconel at 65,000 psi, and 600 F.

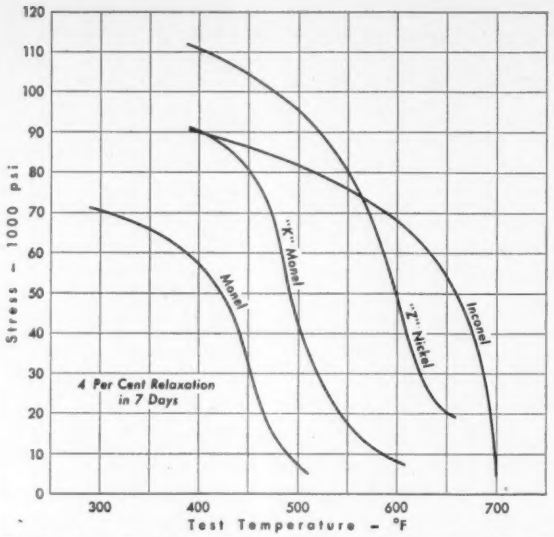


Fig. 28. Stress Required to Produce 4 Per Cent Relaxation of Monel, "K" Monel, "Z" Nickel, and Inconel Springs in 7 Days. ✦

IN the case of Monel it was concluded that a treatment of 1 hr at 650 F would provide practically minimum relaxation under any test conditions suitable for the service of this material. A temperature of 650 F affords almost complete freedom from heat-tarnishing. Since this is a factor in some applications, and since 650 F produces essentially maximum relaxation resistance, higher temperatures are not suggested.

✦ ✦ ✦

IT is not possible even to approach maximum resistance to relaxation in Inconel and still prevent heat tarnishing. As is indicated by Fig. 31, the optimum heat-treatment conditions for this alloy would be 1 hr. at 900 F. This treatment was used therefore, in all subsequent work and is suggested for commercial practice.

✦ ✦ ✦

Appendix 2
Variation of Modulus of Elasticity

THE question of variation of modulus of elasticity with temperature has received relatively little attention in the way of actual test determinations. **Zimmerli, Wood,** and **Wilson** (5) have obtained values of torsional modulus for a number of spring materials, including Monel.

✦ ✦ ✦

KEULEGAN and **HOUSEMAN** (6) made determinations on a number of materials, including Monel, using only the temperature range —50 to +50 C. These data are particularly pertinent to precision spring work where modulus changes under ordinary atmospheric-temperature ranges are significant. They found a drop of 3.2 per cent in the torsional modulus of Monel with a temperature rise of 100 C.

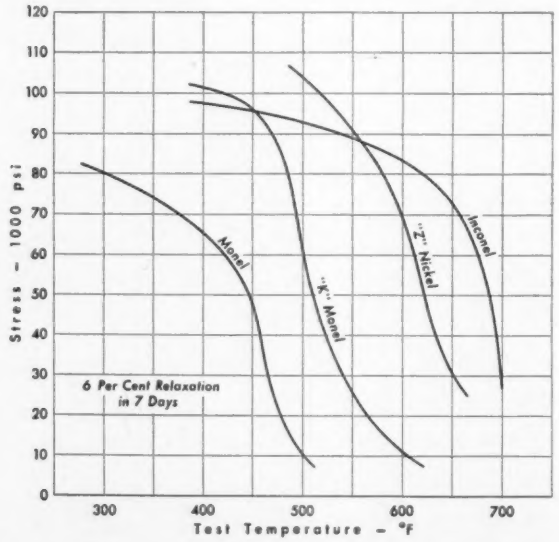


Fig. 29. Stress Required to Produce 6 Per Cent Relaxation of Monel, "K" Monel, "Z" Nickel, and Inconel Springs in 7 Days. ✦

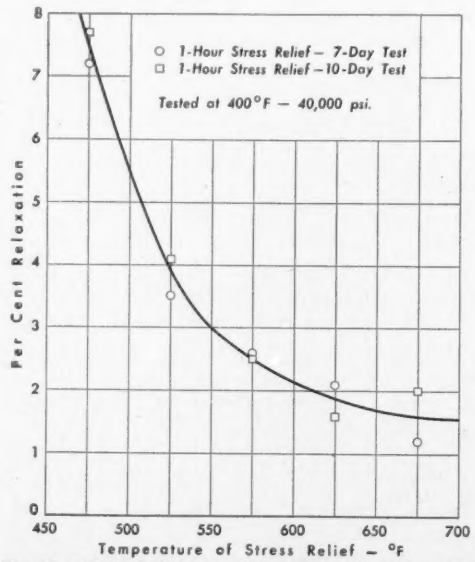

1-Hour Stress Relief – 7-Day Test
1-Hour Stress Relief – 10-Day Test
Tested at 400°F – 40,000 psi.
Per Cent Relaxation
Temperature of Stress Relief – °F

Fig. 30. Effect of Stress-Equalizing Temperature Upon Relaxation of Monel Springs in 7 and 10 days. (Tests runs at 400 F. and 40,000-psi stress.) ✦ ✦ ✦

JASPER (7) has reviewed this subject extensively and quotes the following formula as initially proposed by **Sutherland** (8)

$$\frac{G}{G_o} = 1 - \left(\frac{T}{T_m}\right)^2 \quad \text{[3]}$$

where

G = torsional modulus at any absolute temperature, psi

G_o = torsional modulus at zero temperature absolute, psi

T = absolute temperature at which G is to be computed

T_m = absolute temperature of melting point of material

✦ ✦ ✦

EQUATION [3] is checked excellently by data of nine investigators using eight different pure metals having a wide range of melting points. **Jasper** also quotes tests on several steels which provide an additional check on the formula.

✦ ✦ ✦

THE data for Monel obtained by **Zimmerli, Wood,** and **Wilson,** if plotted with G/G_o as ordinate and T/T_m as abscissa, also provide a reasonable check. These latter data come generally higher than the curve plotted from Sutherland's equation. Thus corrections made according to Equation [3] and applied as explained under "Load and Stress Calculations" in this paper, would constitute over-correction on the basis of the **Zimmerli, Wood,** and **Wilson** data. Such corrections, therefore, would be on the side of safety in that the fiber stress in the springs might actually have been slightly higher than the values reported herein.

✦ ✦ ✦

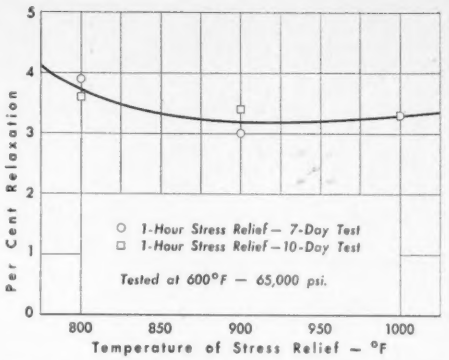


Fig. 31. Effect of Stress-Equalizing Temperature Upon the Relaxation of Inconel Springs in 7 and 10 Days. (Tests run at 600 F. and 65,000-psi stress.) ✦

BECAUSE of these considerations, therefore, values of G_r/G_t for use in Equation [2] were obtained from the curves in Fig. 32. These curves are plotted from known average values of G at 70 F for the materials, together with appropriate values of melting point.

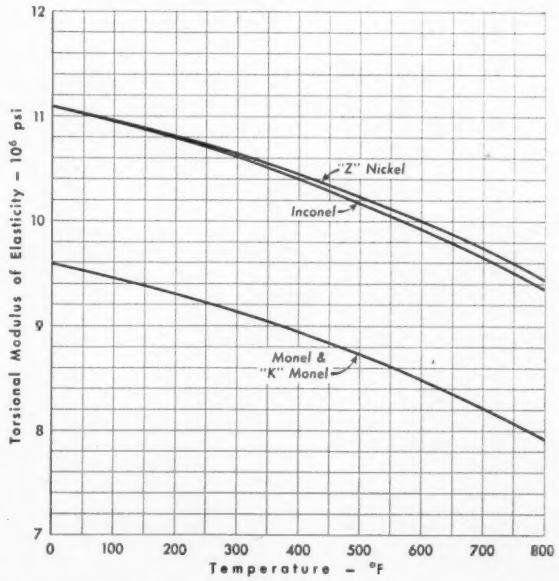


Fig. 32. Torsional Modulus of Elasticity Versus Temperature for Monel, "K" Monel, "Z" Nickel, and Inconel, According to Sutherland's Equation. ✦ ✦ ✦ ✦ ✦

IT should be noted that it is not necessary to know the actual value of G for the specimens tested. The values of 11×10^6 for Inconel and "Z" nickel and of 9.5×10^6 for Monel and "K", Monel are subject to variations of plus or minus approximately 0.3×10^6 from lot to lot. Whatever the value at room temperature for a given sample, the ratio G_r/G_t would not change and, hence, the correction from P_t to P_r by Equation [2] would not be affected.

✦ ✦ ✦

Bibliography

1 "The Creep of Metals—I," by J. McKeown, Metal Industries (British), vol. 56, 1940, pp. 325-328.

2 "Load Losses in Small Helical Springs at Elevated Temperatures," by F. P. Zimmerli, W. P. Wood, and G. D. Wilson, Trans. American Society for Steel Treating, vol. 21, 1933, pp. 796-806.

3 "Effect of Temperature on Coiled Steel Springs Under Various Loadings," F. P. Zimmerli, Trans. A.S.M.E., vol. 63, May, 1941, pp. 363-368.

4 "Stress in Heavy Closely Coiled Helical Springs," by A. M. Wahl, Trans. A.S.M.E., vol. 51, part 1, 1929, p. 185.

5 "The Effect of Temperature Upon the Torsional Modulus of Spring Materials," by F. P. Zimmerli, W. P. Wood, and G. D. Wilson, Proceedings A.S.T.M., vol. 30, part 2, 1930, pp. 350-360.

6 "Temperature Coefficient of the Moduli of Metals and Alloys Used as Elastic Elements-RP531," by G. H. Keulegan and M. R. Houseman, U. S. Bureau of Standards, Journal of Research, vol. 10, Jan.-June, 1933, pp. 289-320.

7 "The Value of the Energy Relation in the Testing of Ferrous Metals at Varying Ranges of Stress and at Intermediate and High Temperatures," by T. M. Jasper, Philosophical Magazine, series 6, vol. 46, 1923, pp. 609-627.

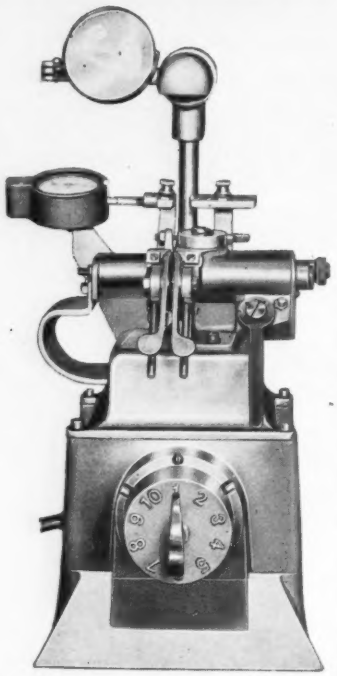
8 "Kinetic Theory of Solids," by Wm. Sutherland, Philosophical Magazine, series 5, vol. 32, 1891, part 2, pp. 31-43, 215-225, 524-553.

The Discussions at The Wire Association Meetings
Will Be Published in Detail in the January, 1943
Issue of Wire and Wire Products.

✦ These Discussions — In Connection With the Published ✦
✦ Papers Will Contain Information of Great Value To All ✦
✦ Wire Production Men — Be Sure To Secure A Copy. ✦

MICROMETER PRECISION MICRO-WELD TRADE MARK REG. U. S. PAT. OFF.

MICRO
WELDERS SET THE STANDARD FOR THE WIRE INDUSTRY



Model E.-I.S. Welder—Capacity .010" to .062" high & low carbon wire

MICRO WELD, butt, flash, and spot welders insure profit and results for the wire manufacturer or fabricator.

MICRO WELD special welders are giving superior service in hundreds of plants. Write or wire for full information about MICRO WELDERS, your inquiry will receive prompt and complete attention.

The little machine on the right welds wire only twice the size of a human hair.

Model JE—Capacity .005" to .020"
One of the Smallest Welders Ever Built

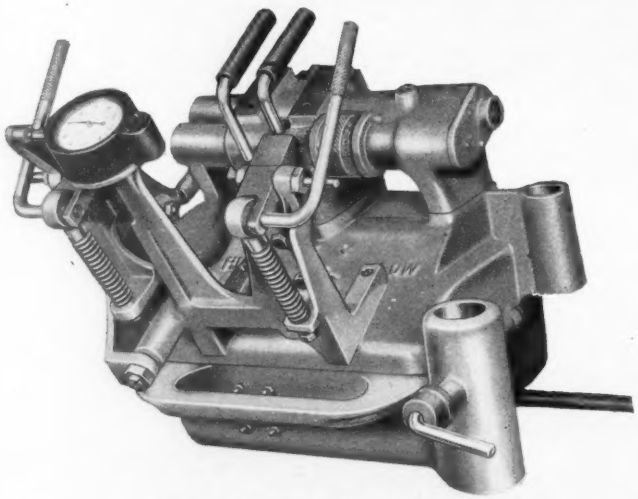
FOR PRECISION WELDING USE MICRO

MICRO WELD welding machines are rugged, efficient, simple and modern. High electrical efficiency, low maintenance and ease of operation are designed into each model.

There is a MICRO WELD model to economically and efficiently perform any welding operation.

Ask Us About Your Problems

Telephone State 7468



Model E Micro-Weld Butt Welder
Capacity #20 to #4 W & M gage high and low carbon wire.

MICRO PRODUCTS COMPANY
20 NORTH WACKER DRIVE, CHICAGO, ILL.

A Welder for Every Purpose

Wire Association Convention Highlights

Details of the Wire Association Convention held at Cleveland, Ohio, October 1942 . . . Plans for 1943 Convention and Regional Meetings are outlined. ✦ ✦

THE result of a convention program designed to meet current war time production problems in the Wire Industry, the 1942 Annual Convention of the Wire Association, held at Cleveland, Ohio, Oct. 12-16, was noteworthy for the large attendance, and for the interest shown in the subjects presented, as evidenced by the discussions at the technical meetings. Since the discussions will be published in full in the January 1943 issue of WIRE & WIRE PRODUCTS (after editing) only brief mention of the highlights will be made at this time.

✦ ✦ ✦

THE opening session was most timely. **"Material Conservation"** presented by **Frederic Luther** of the Western Electric Company —**"Industrial Conservation"** presented by **Ivon B. Tilyou,** Assistant Utility Co-Ordinator of the Industrial Salvage Section of the War Production Board, and the Western Electric Company's motion picture **"Mines Above Ground"** showing salvage and scrap operations, all tied in together as an opening feature and as a timely adjunct to the scrap drive being conducted by the Government.

✦ ✦ ✦

IN discussing **"Trouble Shooting on Bronze and Steel Weaving Wire," L. D. Granger,** Treasurer, American Wire Fabrics Corporation, New York, pointed out the necessity of obtaining a uniform wire in order to produce the best quality of wire cloth and described a special method for testing which was found satisfactory in eliminating faults and reducing troubles. He pointed out the old idea that a weaving mill like a nail mill was a handy place in which to use rejections has long since been exploded and that weaving wire has assumed its place as a special quality product worthy of and demanding all the skill and care of the wire mill for its successful production, and that weaving wire must be of the proper stiffness for the type of cloth to be manufactured. He stated that this applied equally from spring wire to the softest annealed iron possible to produce. The stiffness or temper, he asserted, must be uniform, the wire must be on size and round and it must not be brittle.

✦ ✦ ✦

A DISCUSSION of plant safety methods and accident reduction policies followed the paper entitled **"Reducing Accidents in Wire and Wire Products Operations"** which was presented by **R. H. Ferguson,** Manager of Safety, Republic Steel Corporation, Cleveland. O. The speaker discussed specific accident cases and emphasized the point that the real job for safety is done by the foreman and that when he is "sold," accidents are reduced and real safety results are forthcoming. Many other interesting points were brought out by the speaker and discussed from the floor.

✦ ✦ ✦

IN discussing **"Cemented Carbide Manufacture and Application," A. MacKenzie,** Vice-President in Charge of Manufacturing, Carboloy Company, Detroit, Mich., stated that no difficulty is expected in securing raw material such as tungsten, titanium, tantalum, etc., for the manufacture of cemented carbide, unless new uses develop requiring unexpectedly large quantities of raw materials. He stated that in some instances in the wire, tube and bar-drawing fields, cemented carbides are the only materials that will do the job successfully. He cited cases where cemented carbide dies are being used for drawing steel wire down to 0.010-inch in size and in a few instances as low as 0.005-inch and directed attention to the fact that the cemented carbide industry, due to the impetus of war, has advanced its normal growth by a minimum of ten years.

✦ ✦ ✦

OF vital interest to all wire mill production men is the problem of converting the plant from peace time production to war time schedules. The paper entitled **"Scheduling and Planning the Wire Mill for War Production"** by **L. D. Seymour,** Assistant Works Manager, Canada Works, The Steel Company of Canada, Ltd., not only explained how the problem was solved but gave information which could be readily adapted to similar problems in other mills. The paper was accompanied by a full explanation of the paper work involved and the forms used were exhibited at the entrance to the lecture hall.

✦ ✦ ✦

THE paper on **"Electric Patenting of Wire"** presented by **John P. Zur,** Metallurgical Engineer of The Trauwood Engineering Company, Cleveland, O., on Thursday morning was followed by a demonstration of the process at a plant inspection in the afternoon. About 75 members registered for this demonstration, and something new in the line of patenting was shown the group.

✦ ✦ ✦

The Wire Association Annual Luncheon

A WELL rounded out group of speakers featured the Wire Association Annual Luncheon held

at the Carter Hotel, on Tuesday, Oct. 13th.

✦ ✦ ✦

THE speakers were:

Dr. Arthur J. Culler, Pastor, Heights Christian Church, Cleveland, Ohio, who discussed **"The American Red Cross in War."**

Capt. Melvin L. Payne, U.S.A., Office of the Under Secretary of War, Washington, D. C., who spoke on **"The Progress of the War."**

Dr. Charles Copeland Smith, National Association of Manufacturers, New York, N. Y., whose address was on the topic **"What Makes America Tick?"**

✦ ✦ ✦

FOR once the War Department presented a speaker who gave some real information and presented it in a most able, forceful and interesting manner. **Captain Payne** was excellent!

✦ ✦ ✦

AS for **Dr. Charles Copeland Smith!!** How he did "Make America Tick." Without exception — the most able speaker we have had on our programs; serious and amusing, a master of sarcasm, fully conversant with the industrial development of America — he held his audience spellbound and when he ended, every one had something to seriously think about!

✦ ✦ ✦

The Smoker

ONCE again, **Gus Zapp,** of the Firth Sterling Steel Company, McKeesport, Pa., Chairman of the Smoker Dinner Committee, put it over!! The Smoker drew a record crowd of 430 and was voted by all to be "tops." A vote of thanks goes to **Mr. Zapp** not only for a good show but in appreciation of the days and weeks of hard work and effort required to put such a show together under war conditions.

✦ ✦ ✦

The National Metal Congress

"ATTENDANCE at the exposition halls was the largest in the history of the events," according to **W. H. Eisenman,** managing director of the Congress and Exposition, and national secretary of the sponsoring society, the American Society for Metals.

"TOTAL registration at the sessions of the four societies—**the American Society for Metals, the Wire Association, the American Welding Society and the American Institute of Mining and Metallurgy**—also hit a new high of 23,285. The Exposition closed with a total attendance for the week of 46,538 metal experts from the United States, Canada and South America."

✦ ✦ ✦

"ALL of these sessions, including the ASM war production meetings, were extremely well attended with as many as 1800 persons attending a single session," Mr. Eisenman said.

✦ ✦ ✦

WHILE Chicago has been selected for the Congress and Exposition in 1943, definite plans for the event will not be made until the annual meeting of the board of trustees of the American Society for Metals next June.

✦ ✦ ✦

Annual Meeting of the Wire Association

THE Annual Meeting of the Wire Association was held at the Hotel Carter, Cleveland, O., on Tuesday, Oct. 13th, at 4:00 P. M. with **Mr. Carl Johnson,** Supt. Rod & Wire Mill, Bethlehem Steel Co., Sparrows Point, Md., **President of the Wire Association,** in the chair.

CAPT. MELVIN L. PAYNE, U. S. A.

Captain Payne was assigned by the office of the Under Secretary of War to represent the War Department as a speaker. Prior to entering military service, Captain Payne was engaged in engineering practice in the automotive field. He has been a platform speaker for many years and active in many well-known engineering associations.

✦ ✦ ✦

AFTER the routine business was transacted, the question of holding a convention in 1943 was presented for discussion. It was the unanimous decision that both regional meetings and the National Convention should be held and the resolution below was voted to be placed in the minutes as a matter of record:

October 13, 1942

WHEREAS the members of the Wire Association assembled in convention at Cleveland, October 13, 1942 believe that the activities of this Association are contributing factors in the war effort and

WHEREAS the membership, comprised of technical men, wire mill operators and producers, who through exchange of ideas carried out at Conventions and regional meetings, do promote these contributions therefore be it

RESOLVED that the customary annual and regional meetings of the Association be continued as heretofore.

✦ ✦ ✦

THE decision was made to continue the existing arrangements with the **American Society for Metals** and the **National Metal Congress** for 1943 and to hold our National Convention with them as heretofore. If, however, the A.S.M. do not hold a meeting in 1943, then the **Wire Association** will hold its convention independently at Pittsburgh, Pa., in October.

✦ ✦ ✦

THE idea following was presented to the meeting for consideration and the Secretary instructed to poll the membership by letter for opinions and to ascertain subjects to be covered and the willingness of members to cooperate in such a plan.

During war times, it would seem desirable to institute some continued activity which would not only hold the interest of the members of the Association, but would stimulate the participation of the individual member in its activities.

Since war conditions are causing many changes in processes, the substitution of materials and the redesigning of machinery, it is suggested that we set up a group of committees covering separate topics, such as lubrication, cleaning-house practice, changes in design and improvements in machinery, the substitution of metals and the metallurgical reactions affecting drawing practices as a result, etc.

Possibility of Convention in 1943

THERE has just been concluded in New York City a conference of the members of the **International Association of Convention Bureaus,** representing America's principal convention cities. From this conference, in which the transportation, hotel and exposition industries participated, there came an illumination of certain facets of the future convention pictures.

✦ ✦ ✦

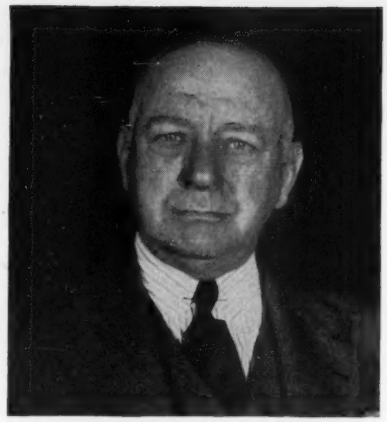
SINCE convention travel has never represented more than 3% of the nation's traffic volume, and since the present traffic problem is concerned principally with mass movement, these things appear to be established:

(1) Essential conventions are being and will continue to be held. Non-essential conventions are and should be deferred for the duration. Extensive study of the nation-wide convention picture proves that more than seventy-five percent of established associations must meet.

(2) The plans and programs of these essential business conferences should be directed principally to the participation of the convening group in our nation's war effort.

(3) The Office of Defense Transportation has specifically stated that the answer to the question of holding a conference lies within each organization. Its recent release, which in part concerned conventions, has been widely misinterpreted as a "death sentence" to all gatherings. That extremely busy governmental agency does not want a flood of inquiries on this question.

(4) Speakers from appropriate federal bureaus strengthen conference programs. The government seeks this outlet for information and direction. (408 national, state and regional meetings in recent weeks heard 1,006 government representatives). In this and other ways conventions actually act to CONSERVE travel, associations and their supplying interests being multiply served in one movement.



DR. CHARLES COPELAND SMITH

Dr. Charles Copeland Smith, Guest Speaker, The Wire Association Luncheon, October, 1942

DR. Charles Copeland Smith is an Englishman by birth, but an American citizen by choice, and has resided here since 1919. He was educated in England, and holds a Ph.D. degree from the University of Manchester. He has been successively minister, sociologist, economist, author, radio commentator, and lecturer, and for many years he wrote a daily column on social subjects for the Chicago "Daily News." He is rated one of the outstanding speakers on industrial subjects today.

✦ ✦ ✦

DR. Smith served in the first World War, and was granted the King's Medal and the thanks of Parliament for his work in developing the textile industry on the Isle of Man, securing employment for more than 15,000 persons. Later, he was appointed industrial supervisor for internment camps

(*Please turn to Page 683*)

Specialists **In Processing Machinery For The Welding Rod Manufacturing Industry**

★ WELDING ROD FEEDING MACHINES
★ EXTRUSION DIE HEADS
★ END BRUSHING MACHINE
★ MIXERS
★ FLUX COATING CENTER GAUGE
★ WELDING ROD EXTRUDING PRESSES
★ TAKE-AWAY CONVEYOR AND BELTS
★ CONVEYOR-TYPE ELECTRODE OVEN
★ SCALES
★ SLUG PRESSES
★ WIRE STRAIGHTENING AND CUTTING MACHINES

We maintain a complete Engineering Department, and are in a position to design and build any auxiliary equipment which you may need.

You are cordially invited to inspect our new offices and plant, together with any equipment we have on the floor at any time you are in Cleveland.

MOSLO MACHINERY COMPANY

2443 PROSPECT AVENUE — CLEVELAND, OHIO

MAin 8864

✦ GOVERNMENT WIRE PRODUCTION INFORMATION ✦

Steel Recovery Program Under Way

FIRST step in the War Production Board's huge steel recovery program, involving the purchase and redistribution of millions of tons of iron and steel products, was taken recently with the mailing by the Steel Recovery Corporation of the first of 200,000 inventory certification forms to known and presumed holders of steel stocks rendered idle or excessive as the result of WPB orders and regulations.

✦ ✦ ✦

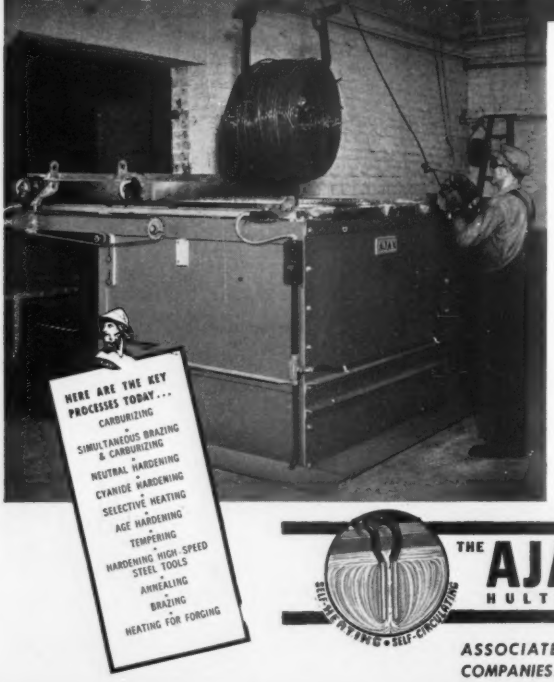
MUCH of the iron and steel that soon will be directed into essential war production is available as the result of the series of orders, issued during the past few months, curtailing or eliminating use of these materials in the manufacture of hundreds of articles of everyday use.

THE report forms now being mailed are simple one-page sheets on which recipients will indicate whether they hold steel inventories and, if so, the types of iron and steel of which they consist. Following receipt of this information, WPB will mail detailed questionnaire forms to cover each type reported, together with schedules of prices to be paid by the Government for material needed for the war effort.

✦ ✦ ✦

THE forms now being mailed must be completed and returned to WPB, c/o Steel Recovery Corporation, 5835 Baum Boulevard, Pittsburgh, Pennsylvania, not later than five days after their receipt by the firms to which they are addressed. Any stocks of the following are to be reported: Non-assembled carbon steel structural shapes, unfabricated and fabricated (including angles of all sizes and sheet piling); carbon steel ingots, billets, blooms, slabs; carbon steel forgings; carbon steel bars and non-assembled products fabricated therefrom; carbon steel wire and non-assembled products fabricated therefrom; carbon steel plates and non-assembled products fabricated therefrom; carbon steel sheet and strip and non-assembled products fabricated therefrom; carbon steel pipe and tubing and non-assembled products fabricated therefrom; carbon steel castings; alloy steel (other than castings) and non-assembled products fabricated therefrom; stainless steel (other than castings) and non-assembled products fabricated therefrom; alloy steel castings (including stainless steel castings); tool steel (high speed, alloy or carbon) in any form other than finished tools, dies and gauges; iron castings; and, wrought iron.

FASTER ··· FASTER ANNEALING!



Extremely fast heating is characteristic of the electric salt bath furnace, and the value of this cannot be exaggerated. The entire annealing cycle is accomplished in minutes (rarely more than 20) compared with hours required with other types of furnaces.

The 150-KW unit shown is capable of annealing high carbon SAE 52100 steel wire at an hourly production of 1500 lbs. If you have not yet investigated the remarkable adaptability of Ajax-Hultgren furnaces to your production program, it will pay you to investigate immediately. Over a thousand installations already made for various types of heat-treating, from 350 to 2400 deg. F.

WRITE FOR CATALOG 107-A. *AJAX ELECTRIC CO., INC.*
FRANKFORD AVE. AT DELAWARE AVE. PHILA., PA.

THE AJAX HULTGREN ELECTRIC SALT BATH FURNACE

SELF-REGULATING • SELF-CIRCULATING

ASSOCIATE COMPANIES: AJAX METAL COMPANY, Non-Ferrous Ingot Metal for Foundry Use
AJAX ELECTRIC FURNACE CORPORATION, Ajax-Wyatt Induction Furnaces for Melting
AJAX ELECTROTHERMIC CORPORATION, Ajax-Northrup Induction Furnaces for Melting, Heat-Treating

OFFICIALS of WPB's Materials Redistribution Branch emphasized the immediate need of steel in war industries, and pointed out that owners are permitted by Priorities Regulation No. 13 to sell directly to qualified users. They urged that those holding needed materials in idle or excessive inventories institute an immediate and intensive hunt for such customers.

✦ ✦ ✦

IN cases of direct sale, the owner receives the going price for his property and war industry benefits by speedy delivery of material which can be used in its present form. In this connection, it was pointed out that while Government prices will be considerably above scrap prices, they will not equal the value of fabricated material, if the material must be remelted before it can take its place in the war effort. Scrap metal, as such, will not be purchased by the Government and should be disposed of through authorized dealers.

✦ ✦ ✦

AS an aid to direct transfers, the Steel Recovery Corporation will endeavor, wherever practicable, to bring together owner and potential buyer.

✦ ✦ ✦

THE Steel Recovery Corporation, organized for the purpose last August, will carry out the purchase and redistribution program arranged by WPB and, as agent for Metals Reserve Company, will handle all fiscal matters involved in the thousands of transactions.

✦ ✦ ✦

Specific Steel Products Export Quota System

AN export quota system for producers of specific steel products, designed to spread the load of export orders within the industry, was established by the War Production Board in Supplement No. 1 to General Exports Order M-148.

✦ ✦ ✦

EXPORT quotas for steel producers will be established by the Director General for Operations within the quantities for

(*Please turn to Page 668*)

Food to the Fighters with the help of KEYSTONE Wire

Food is our basic weapon. Takes a lot of it every day to keep millions of men poised for attack. Takes a lot of wire, too, to help deliver that food to the mouths of fighting men.

Wire in knapsack and mess kitchen utensils, binding wire and strapping for food cartons, wire nails in food crating, ordnance equipment — these are just a few of the many thousand war uses of wire. In guns, tanks, planes, ships and bombs, too, wire plays a mighty important part.

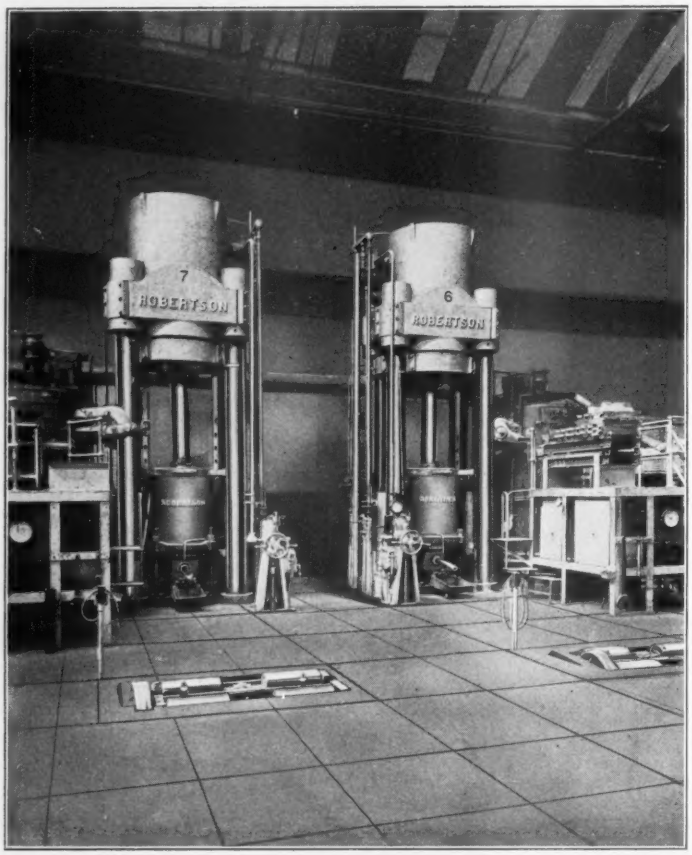
Good reasons are these, why the Keystone mills are "drafted for the duration" . . . to turn out capacity tonnages of wire, wire products, rods and billets. Each to do its job right—to bring Victory *sooner*!

KEYSTONE STEEL & WIRE CO.
PEORIA, ILLINOIS

Special Analysis Wire for All Industrial Uses

SAMSON SPRING WIRE
KEYSTONE STEEL & WIRE CO. PEORIA, ILL.

At Northern Electric too!



Two Robertson Cable Encasing Presses Installed at this Montreal Plant

Throughout the Industry you will find Robertson Equipment performing with the utmost satisfaction in great plants, such as Roebling, Goodyear, General Cable, General Electric, U. S. Rubber, Anaconda, Goodrich, Swan, Boston and others. The simple fact that these concerns choose Robertson Equipment is the great assurance that can be offered of its worth.

Why not see what Robertson Equipment can do for you? Our engineers will gladly place our 85 years of experience at your service — without obligation.

John Robertson Co. Inc.

125-137 WATER STREET, BROOKLYN, N. Y.

Designers and Builders of

All types of lead encasing machinery for rubber hose and electrical cable manufacturers, including Extrusion Presses, Hydraulic Pumps, Melting Furnaces and Pots, Dies and Cores, Hydro-pneumatic Accumulators and Lead Sheath Stripping Machines.

Government Wire Production Information

(*Continued from Page 667*)

which the Board of Economic Warfare has been authorized to assign preference ratings. Producers, in other words, may accept orders for export of steel products covered by the supplement only to the extent of the quota assigned by WPB.

✦ ✦ ✦

PRODUCERS may accept orders for unlisted steel products, and distributors may accept orders for all products, when such orders bear appropriate ratings and are supported by valid export licenses, without reference to the War Production Board.

✦ ✦ ✦

EXPORT licenses and preference ratings covering steel products listed by the supplement will be issued by BEW, which will continue to be responsible for determining the amounts to be exported to individual countries and individual purchasers within the assigned quota.

✦ ✦ ✦

IN addition to other reports required by Order M-148, steel producers who fill purchase orders for exports of such steel products under BEW licenses are required to file with the Iron and Steel Branch of WPB, immediately upon shipment from the mill, a copy of form BEW-138 listing the materials shipped, date of shipment, destination and other details.

✦ ✦ ✦

New Distribution System for Steel Products to Warehouses

TO make a reasonable, but limited tonnage of steel products continuously available for emergency purposes, a new system governing distribution of steel products to warehouses will be put into effect November 1.

✦ ✦ ✦

PRODUCERS who normally supply warehouses are being directed to ship definite tonnages of specific products to warehouses each month on rated orders.

✦ ✦ ✦

THESE "ear-marking" instructions are supplemental to the Steel Production Directives which

have been issued by the Iron and Steel Branch for the past two months.

✦ ✦ ✦

THE principal function of a steel warehouse is to supply steel in quantities too small for steel mills to supply directly. In a recent month, for instance, one warehouse shipped 900 tons of bar on 2,100 orders, more than two-thirds of which were in lots of 500 pounds or less.

✦ ✦ ✦

UNDER the present system, warehouse purchase orders filled in the sequence indicated by preference ratings, which often have been too low to enable warehouses to obtain necessary supplies.

✦ ✦ ✦

VIRTUALLY all of the steel products obtained by warehouses under the system to take effect November 1 will flow directly into the war production program or into other essential uses such as mine, agricultural, railroad, or power plant maintenance.

UNDER Order M-21-b, as amended, warehouses are permitted to sell most steel products only on A-1-a or higher rated orders, except for small percentages sold under repair and maintenance orders such as P-100. Certain other items such as wire, nails, staples and farm fence may be sold by warehouses for repair purposes without a preference rating.

✦ ✦ ✦

THE over-all monthly tonnages needed for distribution by warehouses will be determined by the Iron and Steel Branch. The tonnage required then will be divided among producing mills, according to the pattern of orders they have on hand from warehouses. Varying regional requirements as well as the over-all production obligations of each mill also will be taken into consideration.

✦ ✦ ✦

THE instructions sent to the mills are called "warehouse load directive", and generally instruct the mill to consider a specific tonnage of a specific steel product (such as structural shapes, etc.) as a monthly "warehouse load".

✦ ✦ ✦

PRODUCERS so instructed must accept and fill for shipment each month properly rated purchase orders received from warehouses up to the amount of the warehouse load, notwithstanding any higher-rated orders for such material on a mill's books from other customers.

✦ ✦ ✦

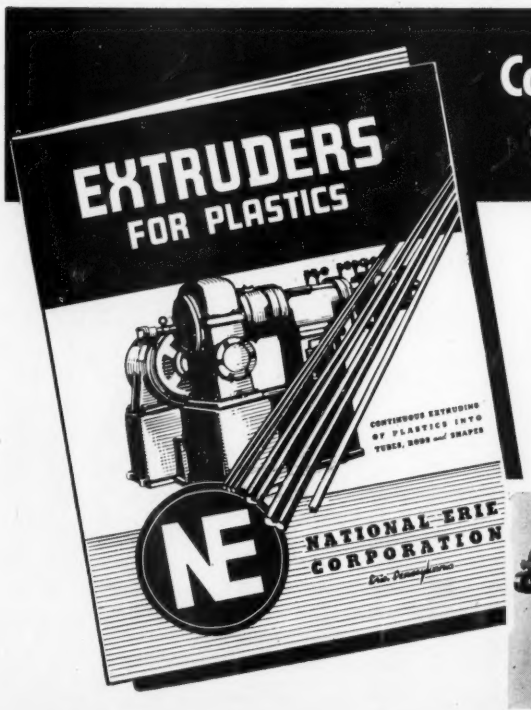
WAREHOUSES are required to place their orders at least 30 days prior to the beginning of the month in which delivery is requested. If this requirement is not observed, the mill is not obligated to schedule the order as part of its warehouse load for that month.

✦ ✦ ✦

Maximum Amount of Steel for Bedspring Set at 15 Pounds

FIFTEEN pounds of steel will be the maximum allowed for a

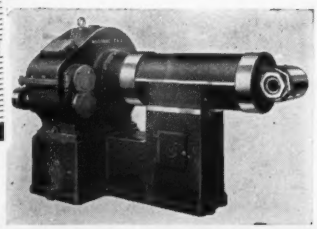
(*Please turn to Page 682*)



Continuous Extruding of Plastics for Wire Insulation and Trim

SEND for a copy of this bulletin that will tell you about a new line of Extruders that has been developed from our well known rubber extruding work. Every machine we build today must contribute directly to the winning of the war—however, you will want to have this bulletin on file whether your need is urgent or not. Write for a copy.

National Erie builds a complete line of Extruders, Presses, Mixing Mills, Special Doors for Pressure Vessels, etc., for rubber and plastics.



NATIONAL-ERIE CORPORATION
ERIE, PA. U. S. A.

Outstanding Personalities of the Wire Industry

W. G. Hume Joins Reynolds Wire Co.

WILLIAM G. HUME has been elected a Vice President of

WILLIAM G. HUME

Reynolds Wire Co., Dixon, Ill.

MR. HUME was formerly General Manager of Sales of the Pittsburgh Steel Co., Pittsburgh, Pa. Immediately before joining the Reynolds company, he had been loaned to the War Production Board and assumed his duties there the day after Pearl Harbor as Chief of the Rod and Wire Products Unit of the Iron and Steel Branch.

✦ ✦ ✦

HE has been in the wire business for 31 years, having been General Manager of Sales for the Keystone Steel & Wire Co., Peoria, Ill., and later, before going to Pittsburgh, was Vice President of the Northwestern Steel & Wire Co., Sterling, Ill. He began his business career in the St. Louis office of the Pittsburgh Steel Co. in 1911.

Two Promotions in Pittsburgh Steel Sales Department

PITTSBURGH Steel Company announces the promotion of two members of its sales organiza-

HENRY A. ROEMER, JR.

tion. **Henry A. Roemer, Jr.**, formerly manager of sales of steel and wire products, is advanced to assistant general manager of sales,

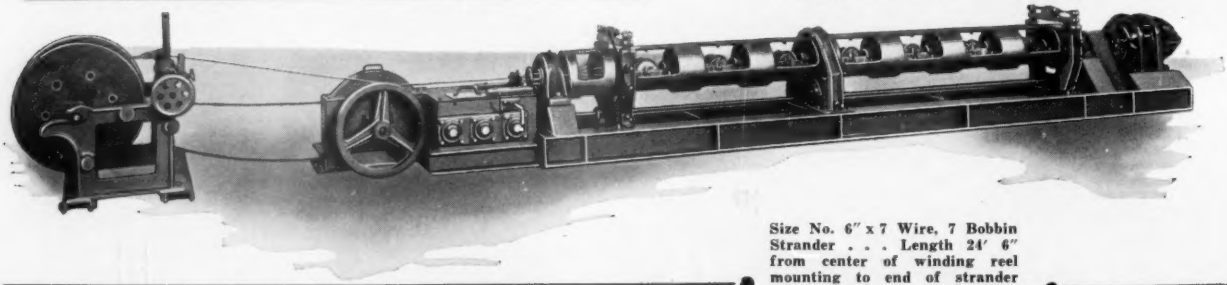
ROBINSON TUBE-TYPE **WIRE STRANDERS**

Dynamically Balanced! No Vibration!

IN this new Robinson Tube-Type Wire Strander are embodied the suggestions of engineers and operators of numerous wire cable plants throughout the country. As a result of careful study and field contact, this machine now meets the most exacting requirements of the industry. Frame, main and take-off bearing mounts, gear housing and base are of all-welded construction—as structurally stable as though cast in a single unit. Steel tube of high tensile strength is statically and dynamically balanced. Gear box is designed to produce any lay within the range of lays required for its size and type. All high-speed gears are fully enclosed; they operate in a continuous oil bath. Supporting rollers of the best quality highly compressed fibrous material are mounted on spindles running in adjustable ball bearings. Bobbin latches and bobbin brakes are of new design and semi-automatic in operation.

Full information available upon inquiry. Your priority rating may permit of immediate consideration.

Write for Illustrated Manual



Size No. 6″ x 7 Wire, 7 Bobbin Strander . . . Length 24′ 6″ from center of winding reel mounting to end of strander motor. Width of strander 31″. Approximate gross weight for domestic shipment 3,000 lbs. Reel stand shipping wgt. 450 lbs.

ROBINSON MANUFACTURING COMPANY
WORKS — MUNCY, PENNA.

Sales & Executive Offices — **30 CHURCH STREET . . . NEW YORK, N. Y.**

UNIQUE

and **Norman F. Melville,** formerly assistant manager of sales of steel and wire products, has been made manager of sales of that department.

NORMAN F. MELVILLE

Geo. L. Randall, Public Relations Manager, Wickwire Spencer Steel Company

GEORGE L. RANDALL who has been with the Wickwire Spencer Steel Company for the past seven years, has just been appointed Public Relations Manager by **E. C. Bowers,** President of the Company.

✦ ✦ ✦

MR. RANDALL will also retain his position as advertising manager of the Company.

✦ ✦ ✦

Erwin E. Brinkman, Plant Mgr., Reynolds Wire Company

THE Reynolds Wire Co. of Dixon, Illinois, announce the appointment of **Erwin E. Brinkman** as Plant Manager. Mr. Brinkman, before coming to the Reynolds Wire Co., was Production Engineer and consultant for seven branches of the Line Material Company of Milwaukee, Wisconsin—and prior to that had been with Holeproof Hosiery Company and Luxite Silk Products, Inc., as industrial engineer and Assistant Factory Manager.

✦ ✦ ✦

MR. BRINKMAN graduated in 1919 from Milwaukee School of Engineering, with a B.S. degree in electrical engineering, and has taught evening classes in industrial management, production engineering, and time and motion study, in several extension universities and vocational schools.

ERWIN E. BRINKMAN

FOR COOLING LIQUIDS USED IN HEAT TREATING • WIRE DRAWING • ROLLING • BROACHING WET GRINDING • CUTTING • WATER JACKETED MACHINES

use the **NIAGARA AERO HEAT EXCHANGER.**

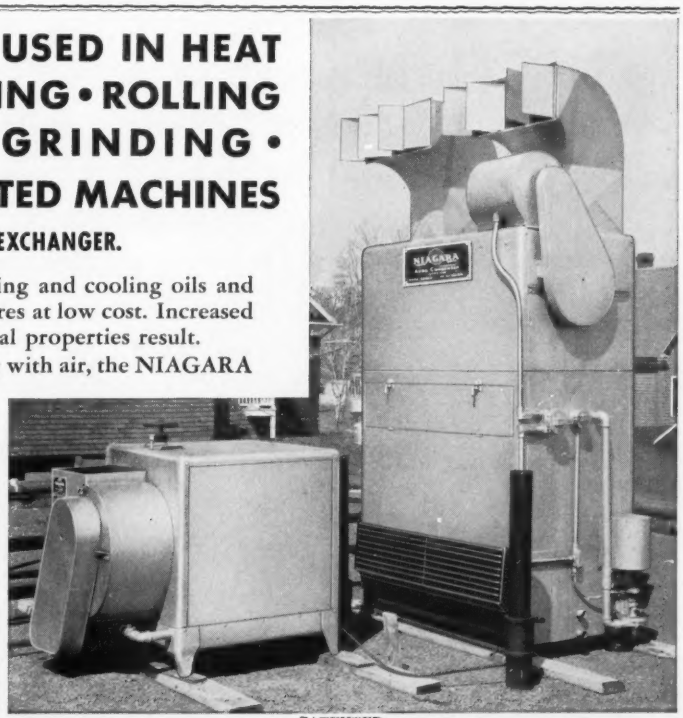
Quenching baths, cooling solutions, lubricating and cooling oils and jacket water are kept at controlled temperatures at low cost. Increased production, decreased spoilage, better physical properties result.

Applying the principle of evaporative cooling with air, the NIAGARA HEAT EXCHANGER cuts the cost of cooling water 95%, saves power, costs less to install than conventional cooling equipment. Closed system prevents adulteration of cooling liquid.

Recovered heat is available for plant heating. Write for Bulletin #90.

NIAGARA BLOWER COMPANY

6 E. 45th Street Dept. WP-112 New York City
37 W. Van Buren St., Chicago, Ill.
Fourth & Cherry Bldg., Seattle, Wash.
673 Ontario St., Buffalo, N. Y.
District Engineers in Principal Cities



PATENTED

NIAGARA *INDUSTRIAL* COOLING • HEATING • DRYING HUMIDIFYING • AIR ENGINEERING *EQUIPMENT*

A Review of Recent Wire Patents

Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 300 Main St., Stamford, Conn.

No. 2,294,534, SPRING STRUCTURE, patented September 1, 1942 by Guido F. Berger, Two Rivers, Wis., assignor to Hamilton Manufacturing Company, Two Rivers, Wis., a corporation of Wisconsin.

Sinuous springs, for a bed structure, are secured to the frame in a new way, according to this patent.

✦ ✦ ✦

No. 2,294,535, WIRE DRAWING LUBRICANT, patented September 1, 1942 by Arthur W. Burwell, Niagara Falls, N. Y., assignor to Alox Corporation, New York, N. Y., a corporation of New York.

The lubricant may comprise about equal amounts by volume of dry hydrated lime and a dry mixture of calcium salts of saturated aliphatic hydroxycarboxylic acids of mineral origin.

✦ ✦ ✦

No. 2,294,653, WIRE COILING MACHINE, patented September 1, 1942 by Carl O. Bruestle, Rahway, N. J., assignor to Syncro Machine Company, Rahway, N. J., a corporation of New Jersey.

A collar block rotates in either of two directions, while a die holder is adapted to be positioned for supplying a strand of wire to the block along either of two paths tangential to the block, at either side.

✦ ✦ ✦

No. 2,294,706, BALE OF SPRINGS, patented September 1, 1942 by Fred R. Zimmerman, Chicago, Ill., assignor to Nachman Springfilled Corporation, Chicago, Ill., a corporation of Illinois.

This inventor provides a flat sinuous wire spring of helical contour and uniform pitch with its flat faces disposed equiangularly to the axis of the helix formed thereby, the pitch of the latter and the angle of the faces to this axis being such that the inner and outer faces of the spring overlap each other over half the width of the spring.

✦ ✦ ✦

No. 2,294,789, APPARATUS FOR CLEANING STRIP, patented September 1, 1942 by Elwin A. Matteson, Youngstown, and Kiel B. Bowman, Warren, Ohio, assignors to The Aetna Standard Engineering Company, Youngstown, Ohio, a corporation of Ohio.

Rotating scrubbers are arranged near jets of hot alkali solution, directed against the strip, and disposed ahead of an alkali bath into which the scrubbed strip is conducted.

✦ ✦ ✦

No. 2,294,919, INSULATED ELECTRIC CABLE AND THE LIKE, patented September 8, 1942 by Jesse B. Lunsford, Washington, D. C.

About the wire conductor are three layers of alternating helically-wound strips or synthetic resin and synthetic lastic, the intermediate winding of the latter being staggered with respect to the outer and inner windings, which overlie.

✦ ✦ ✦

No. 2,295,290, ELECTRIC POWER CABLE, patented September 8, 1942 by Carl A. Piercy, Ballston Lake, and Maurice Guarnier, Schenectady, N. Y., assignors to General Electric Company, a corporation of New York.

The inventor provides paper tape winding of short fibers and unglazed surfaces, in order to prevent migration of films of impregnating material between the layers.

✦ ✦ ✦

No. 2,295,556, SPRING GROUP, patented September 15, 1942 by John E Flesch, Chicago, Ill., assignor to American Steel Foundries, Chicago, Ill., a corporation of New Jersey.

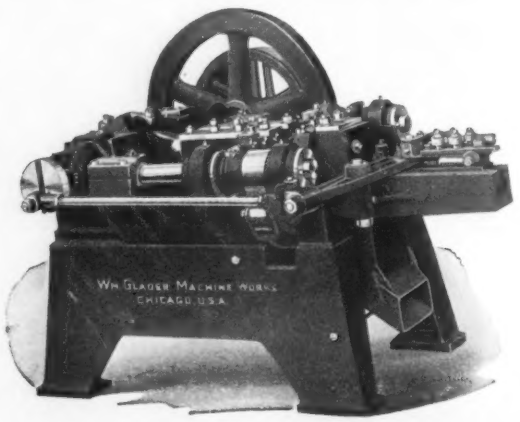
More specifically, this invention is in the class of heavy coiled springs (railroad car) cooperating with friction-absorbing devices interposed between the springs.

✦ ✦ ✦

No. 2,295,726, WIRE CABLE OR ROPE, patented September 15, 1942 by Norman Stanley Ellis, Hamilton, Ontario, Canada, assignor to Metal Textile Corporation, West Orange, N. J., a corporation of Delaware.

A pliant, foraminous axial core, elastically compressible laterally, is provided,

HIGH SPEED WIRE NAIL MACHINE



WM. GLADER MACHINE WORKS

210 N. Racine Ave. Chicago, Illinois

Glader Machines on large head, single-blow roofing nails can be seen in operation at any of the independent wire mills in the United States.

The production figures on common nails shown below, are guaranteed.

SIZE MACH.	SIZE WIRE	MAX. LENGTH OF WIRE	NUMBER OF NAILS PER MIN.	CAP. IN POUNDS PER HR.
#00A	#16	1⅛"	700	37.2
#00	#14	1¼"	550	55
#0	#12	1¾"	450	89
#1	#10	2½"	400	192
#2	#8	3½"	325	310
#3	#4	5"	225	523
#4	#1	7"	190	622
#4s	5/16"	9"	175	1155
#5	3/8"	12"	160	2400

This high output and economical operation account for the GLADER machine being accepted as standard equipment in all recent installations.

with a knitted metallic mesh fabric formed into a rope-like body mass, wire strands being laid upon and about the core, so as to be supported and cushioned thereby.

✦ ✦ ✦

No. 2,296,559, SPRING EDGE MATTRESS OR CUSHION, patented September 22, 1942 by Abraham Krakauer, Brooklyn, N. Y., assignor to Kay Manufacturing Corporation, Brooklyn, N. Y., a corporation of New York.

Wire mesh fabric is employed in the walls of the helical spring structure, and serving as a barrier against upward displacement of the padding or even serving as the sole side and end wall means.

✦ ✦ ✦

No. 2,296,807, MARSHALL SPRING UNIT, patented September 22, 1942 by Paul Cavaler, Detroit, Mich.

The invention lies in the provision of the pockets enclosing the wire coil springs.

✦ ✦ ✦

No. 2,296,838, RUBBER ADHERENT METAL, patented September 29, 1942 by Elgin Carleton Domm, Niles, Mich., assignor to National-Standard Company, a corporation of Michigan.

About the wire coil is hot-galvanized a zinc coating with a thin layer of nickel or cobalt electro-deposited thereon.

✦ ✦ ✦

No. 2,296,854, DIELECTRIC MATERIAL, patented September 29, 1942 by Archie R. Kemp, Westwood, N. J., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York.

This material is said to be particularly adapted for submarine cables, and comprises 66 parts by weight of polymerized aliphatic mono-olefins having a molecular weight above 50,000, 34 parts by weight of crepe rubber and 2 parts by weight of sulphur.

✦ ✦ ✦

No. 2,296,887, SCREW, patented September 29, 1942 by Maxwell A. West, Portland, Oreg., assignor to Champion, Inc., Portland, Oreg., a corporation of Oregon.

The slot in the head has side walls slightly convex from bottom to top, and slightly wider apart at the top of the slot than at the bottom, the bottom of the slot being concaved transversely.

✦ ✦ ✦

No. 2,296,983, MACHINE FOR ATTACHING EYELETS TO WIRES, patented September 29, 1942 by Charles K. Cooper and David L. Jones, Warren, Ohio, assignors to General Motors Corporation, Detroit, Mich., a corporation of Delaware.

Wire lengths are provided with attached metal eyelets, the wire extending about the shank of the eyelet to form a connection with an electrical terminal.

✦ ✦ ✦

No. 2,297,088, UPHOLSTERY PAD SUPPORT FOR MARGINS OF SPRING CUSHION ASSEMBLIES, patented September 29, 1942 by William C. Van Dresser and Edson D. Merry, Detroit, Mich., assignors to Van Dresser Specialty Corporation, Detroit, Mich., a corporation of Michigan.

Spaced-apart arched, paralleling wires are secured at their ends to a pair of rails, with a fabric sheet over the wires and rails.

For Information Regarding The Wire Association Address

Richard E. Brown, Secretary
300 Main Street, Stamford, Conn.

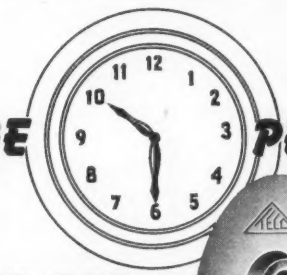
No. 2,297,194, OZONE RESISTANT CABLE INSULATION, Ernst Badum, Bergisch-Gladbach, Germany; vested in the Alien Property Custodian.

This wire cable insulation comprises a body of mixed polymerizates of butadienes and acrylic acid nitrile synthetic rubber compound mechanically and intimately mixed with 10 to 50 per cent by weight of polyvinyl chloride as a filler.

R. J. Schuler, Gen. Mgr., Hampshire Products, Inc., Milan, Mich.

R. J. SCHULER, formerly assistant manager of sales with the Bolt & Nut Division of Republic Steel Corp., Cleveland, has been named general manager of Hampshire Products, Inc., Milan, Mich. Previous to his Republic connection he was general manager of sales of the LaSalle Steel Co., Chicago, for 10 years.

MORE TONNAGE PER DAY



MORE TONNAGE PER DIE

with

TECO Carbide Dies

YOU can't stretch a day into more than 24 hours. But you can make those 24 hours more productive by equipping your wire machines with TECO Carbide Dies.

The high-speed, long-run capacity of TECO Carbide Dies has boosted wire tonnage in plants throughout the industry . . . producing wire of the highest degree of accuracy, quality of finish and physical properties. Moreover, TECO Carbide Dies will give you longer service because their rigidly controlled uniformity, density and hardness reduce wear and friction to a minimum, thus lengthening die life.

Let TECO Carbide Dies stand on their own merits. Make a test run in your plant and compare their output with that of your present dies. TECO Carbide Dies sell themselves!

Wire and Bar Dies, Extruding Dies, Tubing Dies, Sizing Dies. Also, Carbide Blanks, Tools, Bits, Reamers, Forming Tools.

TUNGSTEN ELECTRIC CORPORATION
564 39th STREET • UNION CITY, NEW JERSEY
Branch Office: 2906 Euclid Avenue, Cleveland, Ohio
Representative: Architects and Builders Bldg., Indianapolis, Ind.

TECO — Pioneers in Tungsten Carbides for over a Quarter Century — CARBIDE DIES

Wall Chart Offered By Elastic Stop Nut

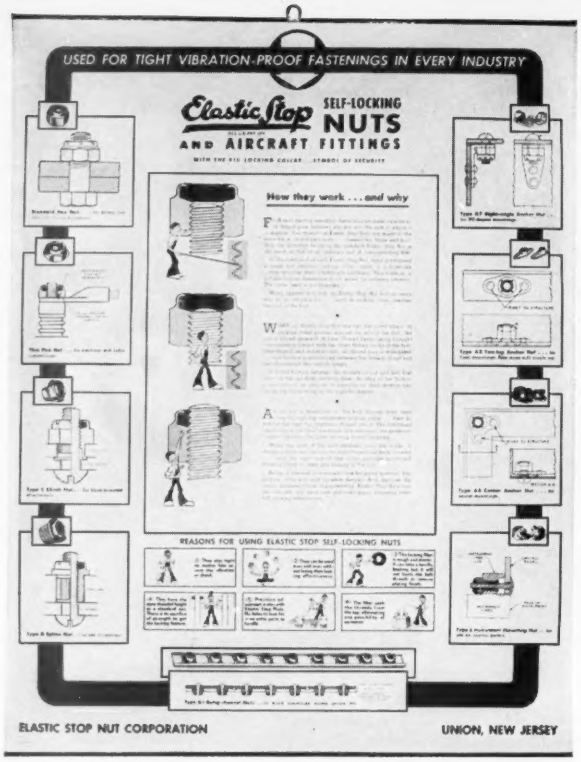
A WALL chart, explaining the uses of its various types of self-locking nuts, is being distributed by Elastic Stop Nut Corporation, Union, New Jersey, to engineering departments, drafting rooms, maintenance shops, and schools.

✦ ✦ ✦

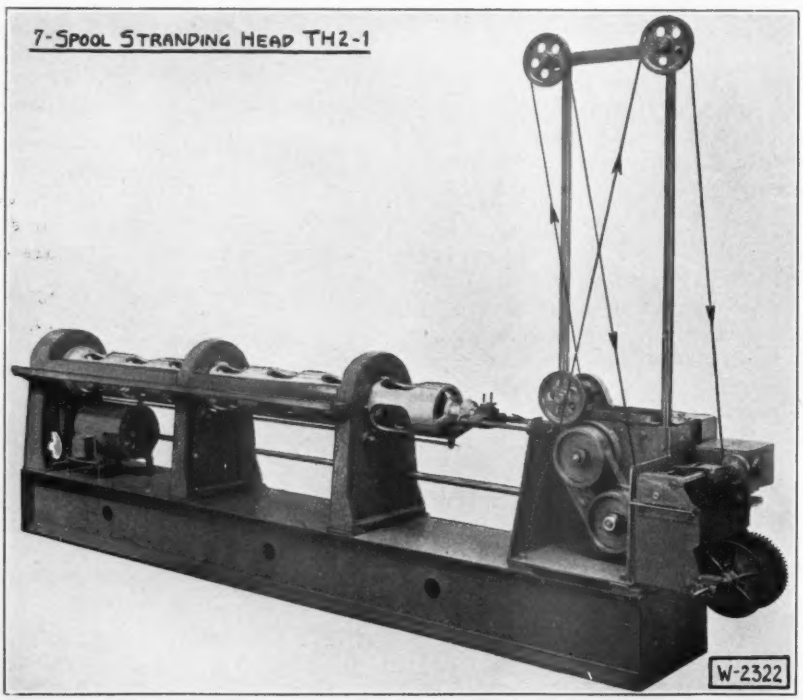
THE center of the chart is devoted to an illustrated description of the basic principle by which a self-locking action is obtained in all Elastic Stop Nuts, regardless of type. This is followed by illustrations of some of the advantages to be obtained by the use of the nuts and, completing the presentation, there are cross-section drawings showing the method of application of the nine types most generally used, with corresponding photographs of these types.

✦ ✦ ✦

THE chart measures 21 by 27 inches and is reinforced at top and bottom by metal strips, with an eyelet for hanging. Copies can be obtained by writing to the manufacturer.


USED FOR TIGHT VIBRATION-PROOF FASTENINGS IN EVERY INDUSTRY
Elastic Stop SELF-LOCKING NUTS AND AIRCRAFT FITTINGS
How they work . . . and why
REASONS FOR USING ELASTIC STOP SELF-LOCKING NUTS
ELASTIC STOP NUT CORPORATION
UNION, NEW JERSEY

THE WATSON MACHINE COMPANY
PATERSON, NEW JERSEY, U.S.A.
ELECTRICAL WIRE AND CABLE AND WIRE ROPE MACHINERY



HIGH SPEED TUBULAR STRANDING HEADS "TH"

PLEASE NOTE:—

1. COMPACT DESIGN
2. RIGID CONSTRUCTION
3. DYNAMICALLY BALANCED ROTOR
4. SUPER-SENSITIVE ELECTRIC STOPS FOR FINEST WIRES
5. 3-SECOND AIR BRAKES
6. DOUBLE-GROOVED CAPSTANS
7. POSITIVE LAYS IN 11 TO 1 LAY RANGE
8. AUTOMATIC - AJUSTABLE SINGLE - SCREW TRAVERSE
9. TUNGSTEN - CARBIDE GUIDES
10. RIGHT & LEFT HAND ASSEMBLY (RIGHT HAND SHOWN)

The Thirty-fourth Annual Autumn Meeting of the Institute of Metals

THE Thirty-Fourth Annual Autumn Meeting of the Institute of Metals was held at the offices of the Institute, 4 Grosvenor Gardens, London, S. W. 1, on Wednesday, September 23, 1942.

✦ ✦ ✦

LIEUT.-COLONEL SIR JOHN GREENLY, K.C.M.G., C.B.E., M.A., President, occupied the Chair.

✦ ✦ ✦

AFTER the minutes of the last meeting and the election of 41 members and student members had been confirmed the Secretary, **G. Shaw Scott**, read the following list of nominations made by the Council as Officers for 1943-44:

PRESIDENT—Lieut-Colonel Sir John Greenly, K.C.M.G., C.B.E., M.A.

VICE-PRESIDENTS — Dr. Maurice Cook (Birmingham); Colonel P. G. J. Gueterbock (Bristol); A. J. Murphy, M.Sc. (London).

MEMBERS OF COUNCIL—Sir Clive Baillieu, K.B.E., C.M.G.)London); J. Cartland, M.C., M.Sc. (London); Dr. A. G. C. Gwyer (Warrington); Dr. C. Sykes (Teddington).

✦ ✦ ✦

IT was stated that the result of the election of the new officers would be announced at the Annual General Meeting to be held in London in March 1943.

✦ ✦ ✦

AFTER the conclusion of the above formal business, the following papers were presented for discussion:

918. "The Cold-Pressing Properties of Duralumin-Type Alloy Sheets, with Special Reference to the Production of Large Pressings for Aircraft." By J. C. Arrowsmith, K. J. B. Wolfe and G. Murray. (April).

924. "Railway Bearing Metals: Their Control and Recovery." By J. N. Bradley and Hugh O'Neill. (August).

If You Are Not A Member Of The Wire Association
Now Is A Good Time To Join!
The Annual Dues Are $10.00

Armored Cable Manufacture Prohibited

MANUFACTURE of armored cable after October 19, 1942, has been prohibited by the War Production Board in order to aid in the conservation of steel.

✦ ✦ ✦

THIS provision is contained in Limitation Order L-165, which also prohibits the acquisition of raw materials for use in the manufacture of armored cable.

✦ ✦ ✦

ARMORED cable is used as a conductor of electricity in interior wiring systems. The order does not affect shipboard cable.

✦ ✦ ✦

APPROXIMATELY thirty manufacturers are affected by the order, but since none make armored cable exclusively, no companies are expected to be forced out of business.

ANNOUNCING A SPECIAL ISSUE FOR JANUARY, 1943

— SPECIAL BECAUSE —

The discussions on technical papers at the annual meeting of the WIRE ASSOCIATION will be published in their entirety in the regular January issue of WIRE and WIRE PRODUCTS.

✦ ✦ ✦

The Directors of the WIRE ASSOCIATION have approved this plan to provide these discussions to all members without extra expenditure.

✦ ✦ ✦

SPECIAL BECAUSE — The Mordica Memorial Lecture for 1942, by Louis H. Winkler, Metallurgical Engineer, Bethlehem Steel Company, Bethlehem, Pa., on the subject "STEEL AND WIRE" will also be published in this issue.

— TO OUR ADVERTISERS —

The advertising value of this special arrangement to be followed in the January issue of WIRE and WIRE PRODUCTS is obvious.

✦ ✦ ✦

Revised rate card will apply to this issue — Closing date, December 20th, 1942.

✦ ✦ ✦

RESERVE YOUR SPACE AT ONCE

WIRE & WIRE PRODUCTS

300 MAIN STREET PHONE STAMFORD 3-0482 STAMFORD, CONN.

SOFT AS A POWDER PUFF

...YET STURDY ENOUGH TO CLEAN STEEL!

REQUIRED: A long-wearing, rust-and-corrosion-proof brush wire for hi-speed whisking of dirt and caustic solution from the surface of strip steel preparatory to tin coating... sturdy enough to wipe 1000 ft. per minute yet soft enough not to scratch its high finish . . . to be used in 12" dia. rotary brushes, 36" wide, turning at mile-a-minute speeds.

Callite's fine gauge nickel-silver wire (.004 to .007 dia.) successfully met this wire requirement, and is being supplied to *The Manufacturers Brush Co.* for their well-known *Samson Rotary Wire Wheel Brushes*... now speeding production to the armed forces.

Special fabrication techniques developed by years of wire making experience assure precision accuracy of size, temper, tolerance and finish. This backlog of experience is at your disposal when you are faced with unusual wire problems.

CALLITE TUNGSTEN CORPORATION
557 39th St., Union City, New Jersey
Branches: Chicago, Cleveland

CALLITE FINE WIRES FOR EVERY NEED

in sizes as small as .002" (smaller if required) . . . for springs, control cables, instruments, control devices, wire cloth, scratch brushes and other applications.

ALUMINUM • SILVER • COMMERCIAL BRONZE • BERYLLIUM COPPER • SPECIAL ALLOYS • EVERDUR • STAINLESS STEEL • BRASS—ALL GRADES • BRUSH WIRE • NICKEL-SILVER • PHOSPHOR BRONZE

Callite Wires
A FINE WIRE FOR EVERY NEED

The Marines Surely Need It—
Let's Speed It!
Cut Out 'If', 'Could' and 'Should'—
Make Good!

Harner Company

BELLEFONTE DIVISION

MANUFACTURER

Bell-Mine Lime Products

For Use in Wire Drawing Processes

PLANT, BELLEFONTE, PA.

SALES OFFICES: PITTSBURGH, PHILADELPHIA, BELLEFONTE, N. Y. CITY

"Words Won't Win This War—Buy War Bonds"

New Di-Acro Catalog

THE O'Neil-Irwin Manufacturing Company, Minneapolis, Minn., experienced such a demand for their first catalog describing machinery for duplicating metal shapes without dies, which was issued in March of this year, that they have had to compile a new edition.

✦ ✦ ✦

THIS new 32 page book, No. 42-2, includes two additional and new Di-Acro Products, a No. 3 Brake, of 18" capacity and a No. 2 Shear, of 9" capacity. These larger size models were designed to meet a demand for machines offering a greater range than the smaller models previously manufactured.

✦ ✦ ✦

THOSE who did not secure a copy of the first book, may now procure the revised one by addressing the Company direct.

✦ ✦ ✦

New Tensile Testing Machine

ENGINEERS of the **W. C. Dillon Company** have broadened the scope and utility of stress testing of materials, by virtue of features incorporated into their new table and floor model portable units.

THIS expansion of useability is particularly noticeable in their table model, an "in-between-size" instrument — so that while small in size, it will physically check specimens up to a foot in length, also accommodating up to nine inch width. In short, it broadly covers tests of small objects and also goes up into the range of larger machines, for it handles up to 10,000 pounds!

THE versatility of this instrument is largely due to its use of the Dillon Dynamometer stress indicator, which permits wide limits of measurement with a uniformly small stress-reader. Height starts of 32" (table model) to 78" (floor type). Paper, plastics, metal, rubber, wood, etc., may be checked readily for elasticity, etc., so long as their breaking point lies between zero and 15,000 pounds, as a number of capacities are now available in this range. Grips can be provided also for special tests such as separational pull of sockets, etc.

✦ ✦ ✦

CONSTRUCTION features include; free floating bearing-supported dynamometer pins, 100% overload protection, close accuracy; universal loading; adjustment for temperature variation; load evenly applied through lower tension screw; table model has level indicator, also safety glass across entire specimen test-space.

✦ ✦ ✦

Martin H. Schmid, Chairman, Armament Steels and Alloys Advisory Committee

MARTIN H. SCHMID, manager of the Alloys Division of Republic Steel Corporation, Massillon, Ohio, has been elected chairman of the Armament Steels and Alloys Advisory Committee, Office of Price Administration.

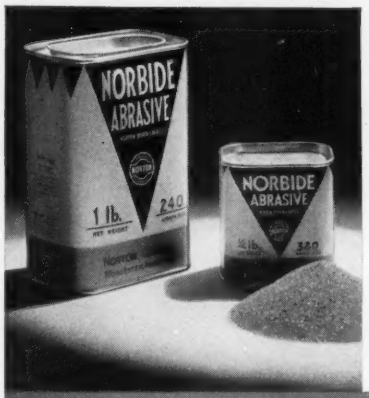
✦ ✦ ✦

THE Committee, made up of ten steel executives, is one of the industry advisory groups created under the Price Control Act of 1942 to discuss any questions or problems which may arise in connection with price control regulations. While purely advisory, it serves as a liaison body between the alloy steel industry and OPA. Through it OPA may receive any suggestions the industry may wish to make regarding maximum prices and pricing procedure.

This is an invitation for you to become a member of The Wire Association.

The Annual Dues are $10.00

An Interesting Report on NORBIDE ABRASIVE



from a prominent die maker:

"In the drilling and ripping of large dies #220 Norbide abrasive grain has replaced the use of silicon carbide with great economy in time and expense.

"Number 320 F. Norbide abrasive grain has eliminated the use of diamond powders in the lapping and semi-polishing operations with equal success.

"In the drilling of small dies up to the point of 'breaking through' Norbide abrasive has proved even more effective than diamond powder."

NORTON COMPANY
WORCESTER, MASS.
N-52

Announcing A Special Issue for January, 1943

— SPECIAL BECAUSE —

The discussions on technical papers at the annual meeting of the WIRE ASSOCIATION will be published in their entirety

and

— The Mordica Memorial Lecture for 1942 —
by Louis H. Winkler, Metallurgical Engineer, Bethlehem Steel Company, Bethlehem, Pa.,
on the subject
"STEEL AND WIRE"
will also be published in this issue.

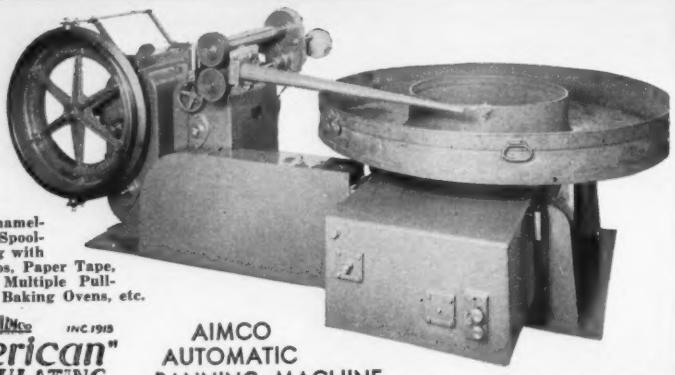
✦ ✦ ✦

— TO OUR ADVERTISERS —

The advertising value of this special arrangement to be followed in the January issue of WIRE and WIRE PRODUCTS is obvious.
Revised rate card will apply to this issue - Closing date, December 20th, 1942.

RESERVE YOUR SPACE AT ONCE

WIRE & WIRE PRODUCTS
PHONE STAMFORD 3-0482
300 MAIN STREET STAMFORD, CONN.



WIRE MACHINES FOR

Drawing, Enameling, Tinning, Spooling, Insulating with Glass, Asbestos, Paper Tape, Cotton, etc. Multiple Pull-outs, Electric Baking Ovens, etc.

EST 1885 AIMCO INC 1913

"American" INSULATING MACHINERY COMPANY

AIMCO AUTOMATIC PANNING MACHINE

For Rubber Covered Wire Ball Bearing

517 West Huntingdon St.

PHILADELPHIA PENNSYLVANIA U.S.A.

FORMING WITHOUT DIES

For 5 pieces, 500 or 5,000!

If you need any quantity from just a few duplicated parts up to sizable production runs — you can often make them faster and avoid die expense and delay by using DI-ACRO Precision machines — Shears, Brakes, Benders.

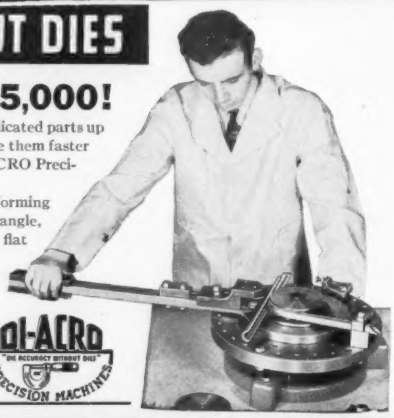
Illustrated: DI-ACRO Bender No. 2, shown forming ¾" O. D. tube, accurate to .001". Also bends angle, channel, rod; round, half-round, square and flat wire; moulding, strip stock, etc. Capacity, ½" cold rolled solid steel bar or equivalent.

Send for Catalog — "METAL DUPLICATING WITHOUT DIES"

O'NEIL-IRWIN MFG. CO.

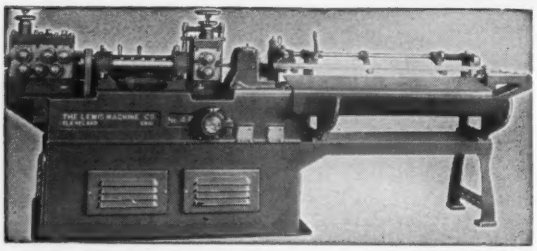
303 8th Avenue South

Minneapolis, Minnesota



DI-ACRO "THE ACCURACY WITHOUT DIES" PRECISION MACHINES

LEWIS TRAVELCUT WIRE STRAIGHTENING and CUTTING Machines



Machines for 1/16" to ¾" rod

Round

Square

Flat

Hexagon

Ferrous and Non-Ferrous

Automatic

High Speed

Heavy Duty

The Sign of Dependable Service:

WE CAN SUPPLY AND ENGINEER OUR TOOLS EQUIPPED WITH CARBOLOY CEMENTED CARBIDE

THE LEWIS MACHINE CO., 3445 E. 76 St., Cleveland, Ohio

NILSON AUTOMATIC PRESS AND FOUR SLIDE MACHINE

FOR SWAGING, STAMPING, PIERCING, BLANKING, FORMING OF COILED METAL

WE also build machines for forming Paper Clips, Buckles, Gate Hooks, Coat and Hat Hooks, Ceiling Hooks, Wire Ears, Cable Rings, Screw Eyes, Sash Chains, Automobile Side Chains, Flat Open Link Chains, Staples, Cotter Pins, Hose Clamps, Etc., and Wire Straighteners, Wire Reels, Frame Bending Machines and Special Presses.

For Complete Details Address —

THE A. H. NILSON MACHINE CO.

BRIDGEPORT, CONN., U. S. A.

Control Chart Method of Controlling Quality During Production

ANY manufacturer with a government contract who is getting too many units rejected can get some valuable help by following the recommendations of a new American War Standard dealing with the control of quality in mass production.

✦ ✦ ✦

THIS standard shows the manufacturer how he can keep track all the time of his production process by means of a quality control chart. This chart carries a pair of control limits which serve the manufacturer as a criterion in deciding whether things are running smoothly or whether he should be on the lookout for trouble in the production process. The control limits are computed from quality measurements made on a number of samples of the product. Once they have been placed on the chart, the manufacturer keeps on taking samples at regular intervals, for example, one sample of 5 units every hour. A "unit" may be a rivet for an airplane, a shell fuse, or a test piece taken from a textile fabric. Each unit of the sample is inspected and a point representative of the quality of the entire sample is plotted on the control chart. So long as the plotted points stay **inside** the control limits, the manufacturer may reasonably assume that there is nothing in the process that will spoil the quality of the product. However, if a plotted point falls **outside** the limits, this is a signal warning the manufacturer to watch for trouble. Normally, the control limits fall inside the manufacturing limits—that is, the limits given in the specification for the product that must be met by each individual unit. Therefore, if a plotted point on the control chart falls outside the control limits, this does not necessarily mean that something is wrong with the product: the quality of the units being produced may still lie within their specified manufacturing limits. What the "outside" point on the control chart **does** mean is that the manu-

It's GOOD! It's NEW!

It's GOOD NEWS to WIRE MEN!!!

Here's Why:

APEX "PIC-KLEEN" *eliminates* lime in many cases; a valuable *addition* to lime in *all* cases.

APEX "PIC-KLEEN" *entirely* eliminates time-consuming *sull-coat* operation.

APEX "PIC-KLEEN" is the finest *rust-inhibitor* for pickled wire under adverse storage conditions.

APEX "PIC-KLEEN" conserves dies and lubricants.

FOR USE ON ROUNDS AND SHAPES; ON HIGH OR LOW CARBON WIRE.

Negligible cost makes your inquiry imperative.

Address inquiries to:

APEX ALKALI PRODUCTS COMPANY

MAIN & RECTOR STS., PHILADELPHIA, PA.

HELPS SPEED-UP WAR PRODUCTION!

Today . . . speeding up war production is the wire industry's NUMBER ONE job! In many well-known wire mills, Oakite Composition No. 24 and other Oakite materials help INCREASE OUTPUT in degreasing and drawing wire.

Their standardized use has also contributed materially to the establishment of such other outstanding, money-saving advantages as (1) longer die life, (2) brighter wire, and (3) shorter baking time.

We shall be glad to work with you and make tests to HELP YOU establish the same results in your mill. Since there is no obligation, won't you write us today?

OAKITE PRODUCTS, INC.
52A THAMES ST. NEW YORK, N. Y.

Representatives in All Principal Cities of the United States and Canada

OAKITE CERTIFIED CLEANING
MATERIALS METHODS SERVICE

facturer must expect that there is something wrong in the production process which is causing excessive variation in quality. Therefore, he must expect also that units of the product will be rejected shortly.

✦ ✦ ✦

HOWEVER, since he has advance warning, he may be able to prevent these rejections by finding and removing the cause of the trouble before it becomes serious. If he does this, and the points subsequently plotted on the chart fall within the control limits again, he may safely assume that the process has been duly adjusted. Obviously, the sooner the manufacturer gets a warning of this kind, the greater the chance of his catching the trouble early enough to prevent spoilage of quality. Therefore, the control chart should be kept as close as possible to the spot where trouble may occur. A well-known firm making small arms and ammunition is reported to have placed a control chart on every machine performing an operation on the product. Thus, a cause of trouble in the process can be quickly spotted and removed.

✦ ✦ ✦

THE new standard, Control Chart Method of Controlling Quality During Production (Z1.3-1942), is available from the American Standards Association, 29 West 39th Street, New York City, at 75 cents a copy.

✦ ✦ ✦

Wickwire Spencer Awarded "M" Pennant

THE Palmer, Massachusetts, plant of the Wickwire Spencer Steel Company was awarded the Maritime "M" Pennant and the Victory Fleet Flag in a ceremony at the plant on October 14th.

✦ ✦ ✦

CARL KING, Superintendent of the Palmer Plant, acted as master of ceremonies, with **Carl I. Collins**, Executive Vice President accepting for the Company and **Henrik W. Forsman** for the employees. Mr. Forsman has been with the Company 42 years. **Commissioner Thomas M. Woodward**, U. S. Maritime Commission, made the award.

If you MAKE or USE WIRE YOU NEED ONE OF THE MANY

Porter Cutters

Indispensable in wire mills for sampling large wire.

In almost universal use by wire fabricators for cutting reinforcing fabric, fencing, spring wire, etc.

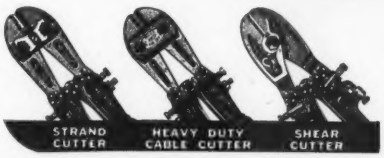
Useful in any plant—large or small—for all sorts of maintenance and repair work—for cutting bolts, rods, wires, rivets, wire rope, chains, or for splitting deformed or "frozen" nuts.

There is a standard Porter tool for every cutting job up to ¾" annealed bolts or ½" hardened chains. Special cutters designed to fit your industry's needs.

Send for Catalog of PORTER CUTTERS.

SEND FOR CATALOG

H. K. PORTER, INC.
EVERETT, MASS.



Coatings for Drawing Stainless, Low & High Carbon and Copper Coated Wire

Gilron

"Gilron" Coating Compounds increase drawing speed of stainless steel wire considerably. Multiple reductions can be drawn without recoating. Excellent results on welding wire.

Better Looking Finish
No Scratching
Longer Die Life

Please write for full particulars.

Gilron Products Co.

1559 East 40th Street • Cleveland, Ohio

Wartime
Wire for a thousand uses
Versatile Continental wire is produced in sizes from 34 gauge to 5/8 inch, in standard and special shapes . . . and in a wide range of analyses, tempers and coatings.
CONTINENTAL STEEL CORP., KOKOMO, INDIANA
(The Superior Sheet Steel Co., Canton, Ohio — a subsidiary
CONTINENTAL STEEL CORPORATION
SHEETS Black, Galvanized, Copperized, Hot and Cold Rolled, Special Coated, Long Terne, etc.
WIRES: Bright Basic, Annealed, KOKIK, Copperized, Tinned, Special Manufacturer's, etc.
CONTINENTAL STEEL CORPORATION SUPERIOR WIRE

STEELSKIN
REG. U. S. PAT OFFICE
For High or Low Carbon Wire
WIRE, TUBING, STAMPING, DEEP DRAWING SOAPS and COMPOUNDS
Established 32 years
R. H. MILLER CO., Inc. Homer, N. Y.

WIRE DRAWING LUBRICANTS
HIGH OR LOW CARBON WIRE, COLD HEADING, BRIGHT AND WET WIRE DRAWING.
STANDARD "WIRE DRAW"
SPECIALLY ADAPTED FOR HIGH SPEED DRAWING MACHINES
BETTER FINISHED WIRE — LOWER DIE COSTS
STANDARD INDUSTRIAL COMPOUNDS CO.
4600 FERDINAND STREET CHICAGO, ILLINOIS

STEEL WIRE
By MAURICE BONZEL
Translated and Published by
KENNETH B. LEWIS, Consulting Engineer
PRICE $15.00
495 Pages — 414 Illustrations
SEND ORDERS TO
WIRE and WIRE PRODUCTS
300 Main Street Stamford, Conn.

Metallurgists Wanted in the War Program

IN the mobilization of manpower for the civilian war service of the Government there is a continuing call for scientifically and technically trained men and women. Among those urgently needed are Metallurgists for work in connection with specific problems in the field of metallurgy—problems connected with some phase of the War program.

✦ ✦ ✦

THE Civil Service Commission is recruiting Metallurgists under two new examinations recently announced. Announcement No. 238 for positions paying $2,600 to $5,600 and Announcement No. 254 for junior grade positions paying $2,000.

✦ ✦ ✦

THE requirements of the examinations have been modified and college teaching in metallurgy is now accepted as professional experience.

✦ ✦ ✦

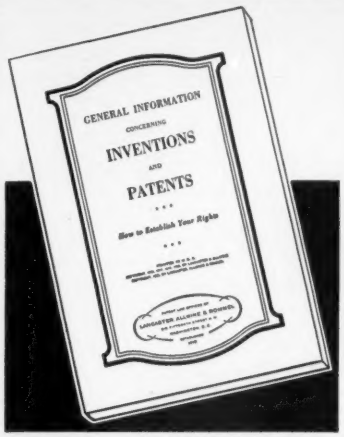
FOR the higher grade positions ($2,600 to $5,600) the requirements now are: completion of a four-year course with major study in metallurgy or closely allied subjects and a minimum of two years of professional experience (which may include college teaching) in metallurgy. Additional experience will be required for the higher grades.

✦ ✦ ✦

FOR the junior grade positions ($2,000), the requirements are: (1) completion of a four-year college course in metallurgy or metallurgical engineering; or (2) completion of a four-year course in an allied subject supplemented by (a) one year of paid experience in metallurgy (which may include college teaching), or (b) 15 semester hours in metallurgy or metallurgical engineering, or (c) two War Training Courses in metallurgy. Applications will be accepted from college senior or graduate students who expect to complete the required courses within 6 months after filing applications.

✦ ✦ ✦

APPLICATIONS will be accepted until the needs of the service have been met. There are



Send for a copy - it's free.

Interesting Booklet concerning Inventions, Patents, Trade-Marks and Copyrights, together with Schedule of Government and Attorney's fees, sent free on request. Simply ask for "booklet and fee schedule."

No charges are made for preliminary advice, either in connection with patent, trade-mark or copyright cases.

Lancaster, Allwine & Rommel
Registered Patent & Trade-Mark Attorneys
438 Bowen Bldg., Washington, D. C.

ORDER YOUR COPY NOW—
LIMITED EDITION

Diamond and Gem Stone Industrial Production

PAUL GRODZINSKI

PRICE $5.00

The use of diamonds and gem stones as dies for fine wire drawing, and of diamonds for cutting tools, is comparatively recent. Today it is extensive and increasing. In this book the author has brought together all the data and information available on the subject and has added the results of his own experience and research. Although dealing mainly with the actual production of the dies and tools, the knowledge this book imparts is of prime importance to tool users. Efficiency and economy in the use of diamond and gem stone dies and tools is not possible without a knowledge of production methods.

✦ ✦ ✦

There are reference tables and a large number of specially drawn illustrations included in this book. An endeavor has been made to leave no phase of the subject untouched.

MAIL YOUR ORDER TODAY

WIRE & WIRE PRODUCTS
300 MAIN ST. STAMFORD, CONN.

no age limits for these examinations. No written test is required.

✦ ✦ ✦

ANNOUNCEMENTS and application forms may be obtained at any first- or second-class post office or from the Civil Service Commission, Washington, D. C.

✦ ✦ ✦

R. H. Langdon, Field Engineer, Pittsburgh District, The Norton Company

R. H. LANGDON has been appointed Field Engineer in the Pittsburgh district by Norton Company, Worcester, Mass., and **E. P. Gregory** has been appointed Field Engineer in the Chicago district.

Statement of ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912 and March 3, 1933, of Wire & Wire Products published monthly at Washington, N. J., for October 1, 1942.

State of Connecticut, County of Fairfield, ss.: Before me, a Notary Public in and for the State and county aforesaid, personally appeared Richard E. Brown, who, having been duly sworn according to law, deposes and says that he is the President of Wire & Wire Products and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, Quinn-Brown Publishing Corporation, 300 Main St., Stamford, Conn.; editor, Richard E. Brown, 300 Main St., Stamford, Conn.; managing editor, none; business manager, R. S. Spengel, 300 Main St., Stamford, Conn.

2. That the owner is: (if owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Quinn-Brown Publishing Corporation, 300 Main St., Stamford, Conn.; Leta B. Brown, of 300 Main St., Stamford, Conn. and Richard E. Brown, 300 Main St., Stamford, Conn.

3. That the known bondholders, mortgagees, and other security holders owning or holding one per cent of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

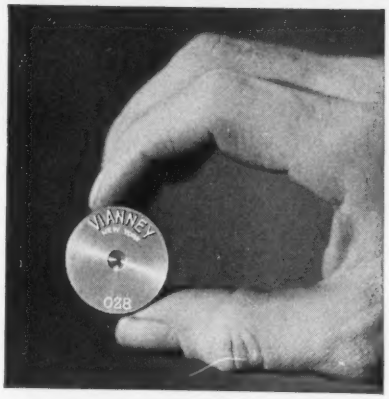
4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

RICHARD E. BROWN
(Publisher)

Sworn to and subscribed before me this 21st day of September, 1942.

(SEAL) JAMES D. WEIR,
Notary Public.

VIANNEY
Famous Wire Drawing Diamond Dies



These famous Diamond Dies are now produced here at moderate prices.

All sizes are in stock or made to order to your specifications

VIANNEY WIRE DIE WORKS
250 E. 43rd. St. New York.
V. J. Boulin, Manager

Be Sure to Specify

WILLEY'S
TUNGSTEN CARBIDE DIES

- WIRE DRAWING
- EXTRUSION
- SIZING

They have exceptional abrasion resistance, are free from porosity and take a high polish. Standard one-piece round dies from stock in many sizes. Four classifications from blank and rough cored nibs to finished dies, ready to use.

WRITE FOR CATALOG
Full information on all sizes and classifications.

Sales Engineers in Principal Cities

WILLEY'S CARBIDE TOOL CO.
MANUFACTURERS AND SPECIALISTS IN
TUNGSTEN CARBIDE TOOLS
1140 W. VERNOR HIGHWAY • DETROIT, MICHIGAN

GREATER WIRE-DRAWING MILEAGE RECORD

BALLOFFET
DIES AND NOZZLE CO., Inc.
6825 Adams St., Guttenberg, N. J.
Quality Diamond Dies Since 1870

DIAMOND WIRE DRAWING
DIES
Compare Quality and Prices and You'll Specify "AJAX"
AJAX INDUSTRIAL SUPPLIES, INC.
226 E. Columbia St. Fort Wayne, Ind.
Telephone: E 3126

Wire Drawing and Extrusion Dies made of DIAMONDS, COMPOSITION, etc.
F. KRAUSE & CO.
202 Pennsylvania Ave., Hillside, N. J.
Phone Elizabeth 2-1109

Wire Drawing Diamond Dies
COCHAUD
WIRE DIE CORPORATION
300 W. 56th St., NEW YORK
Tel. Col. 5-1340

Government Wire Production Information

(*Continued from Page 669*)

full sized bedspring after December 1, the War Production Board ruled recently. For a single or twin-size bedspring, the maximum steel content will be nine pounds.

✦ ✦ ✦

IN an amendment (No. 2) to Order L-49, covering production of bedsprings, the WPB also reduced the total amount of iron and steel available for manufacture of bedsprings. Producers are now limited in each calendar quarter to this total iron and steel consumption: (1) 3⅛ per cent of their total consumption for coil, flat and fabric types during the year ending June 30, 1941; plus (2) 6¼ per cent of what they used during the base period for production of box bedsprings. This total amount of iron and steel can be used by the individual manufacturer for production of any type of bedspring he chooses.

✦ ✦ ✦

PREVIOUSLY the total amount of steel manufacturers could use in each quarter was limited to 6¼ per cent of the base period consumption for coil, flat and fabric springs, plus 12½ per cent of the amount used during the base period for box springs.

✦ ✦ ✦

THE limitation on use of iron and steel is effective as of October 1.

✦ ✦ ✦

UNTIL December 1, 30 pounds of steel can be used in full-sized coil, flat and fabric bedsprings, and 22 pounds in a single or twin size of the same type. Box bedsprings are limited to 22 pounds for the full size and 16 pounds for the single or twin size during this period.

✦ ✦ ✦

APPROXIMATELY 15,000 tons of iron and steel will be saved annually as a result of recent action, in addition to savings resulting from previous limitations.

✦ ✦ ✦

FULL-SIZE bedsprings in normal times contain from 60 to 100 pounds of steel. It was pointed out, however, that through simplified design, wooden frames, and production of lighter-type springs, the industry can continue to turn out bedsprings under the limitations imposed recently.

✦ ✦ ✦

Restriction on Hairpins Expected To Save About 5,700 Tons Steel in Year

IN a further move to cut down on the use of steel in the manufacture of hairpins and bobpins, Order L-104 has been amended to restrict manufacture of hairpins to a rate equal to 25% of 1941 production. The amendment is effective immediately. The original order, issued April 25th, had already cut production by 50%.

✦ ✦ ✦

THE amendment also prohibits bulk sales of both bobpins and hairpins and provided that no more than 100 pins may be in-

DIAMOND CARBIDE
DIES
KELLY
WIRE DIE CORPORATION
19 W. 34th St. New York

DIAMOND DIES
.000's to .102
Fort Wayne Wire Die, Inc.
2625 E. Pontiac St. Fort Wayne, Ind.

Diamond Dies for Wire Drawing
Wayne Wire Die Company
200 Pennsylvania Ave.
Hillside, N. J.
ELizabeth 2-2456

DIAMOND WIRE DRAWING DIES
INDIANA WIRE DIE COMPANY
2234 Holton Ave.
Fort Wayne, Indiana

DIAMOND AND CARBIDE WIRE DRAWING DIES
RUSCH WIRE DIE CORPORATION
275 Seventh Ave., New York, N. Y.

Wire Drawing Machinery

Featuring —
High Speed Upright Cone Machines.
Also —
Bull Blocks and Benches, Continuous Wire Drawing Machines, Spoolers, Pointers, String-up Machines, etc.
And —
Cold Heading Machinery.

WATERBURY FARREL FOUNDRY & MACHINE CO.
Waterbury, Conn.

UNIVERSAL WIRE REEL

Quickly and easily adjusted to any angle within 90 degrees. Cut shows one angle.
Write for circular R

THE F. B. SHUSTER CO.
New Haven, Conn.
Straightener Specialists Since 1866

Hy-Carbo Steel Co.
EST. 1917

EQUIPMENT AVAILABLE FOR REDRAWING ROUND WIRE
Less Ton Lots A Specialty

LOWELL, MASS.

ROSS ROD • WIRE BAKER

J. O. ROSS ENGINEERING CORP.
350 Madison Avenue, New York, N. Y.
CHICAGO DETROIT

WIRE SPOOLING MACHINERY
and
SPECIAL MACHINERY

Address inquiries to
ROBERT J. EMORY COMPANY
Sherman Ave. & Runyon St.
Newark, N. J.

FOR YOUR SPOOLS AND REELS

Patented all-steel electro-welded Drawing and Annealing and patented metal-bound shipping spools and reels.

Hubbard Spool Company
1624 Carroll Avenue, Chicago, Illinois

WANTED

Person capable of taking charge, medium sized wire drawing plant and diamond die department, middle west.

Apply Box #338, c/o
WIRE & WIRE PRODUCTS

cluded in one package. Formerly only hairpins were covered by such a restriction.

✦ ✦ ✦

ACCUMULATION of inventories of raw materials is restricted by the amendment to an amount large enough to cover production over a 30-day period.

✦ ✦ ✦

THE order had originally prohibited further purchase of high-carbon steel wire used in manufacture of bobpins. This restriction is now removed.

✦ ✦ ✦

COMPARED with 1941 consumption, approximately 5,700 tons of steel will be saved as a result of the curtailment. In 1941 over 7,600 tons of steel were used in the industry, with consumption divided about equally between high-carbon and low-carbon steel. Under the new production cut, 1,900 tons of steel will be used in manufacture of such pins next year.

✦ ✦ ✦

Wire Association Convention Highlights

(*Continued from Page 665*)

by the Hague Convention, and organized employment for prisoners of war. Since then, in his various capacities, he has contacted many other phases of industry and is fully aware of its various intricate problems as well as its great importance to our victorious war effort.

When writing your suppliers, please tell them you saw their advertising in WIRE & WIRE PRODUCTS. It helps them and it helps us. Because of their advertising we are able to render a valuable editorial service to our field. It's the American Way!

R O D I N E

CHEMICALS ACP PROCESSES
Use Rodine in the Pickling Bath to Prevent Smudging and Acid Brittleness.

AMERICAN CHEMICAL PAINT CO.
AMBLER, PA.

GEORGE D. HARTLEY

CONSULTANT & SPECIALIST
In Wire Manufacturing & Wire Forming Equipment

Development & Research
New Processes — Designing
Inventions — Patents

372 MAY ST., WORCESTER, MASS.

KENNETH B. LEWIS
CONSULTING ENGINEER
Wire Mill Equipment, Layout and Practice
43 Midland St., Worcester, Mass.
Phone: Worcester 5-6033

CONSULTANT AND SPECIALIST
DRAWING LUBRICANTS
Hans C. Bick, Inc.
READING, PA.

WIRE MACHINERY SPECIALISTS

3—Nilson No. 1, 3 & 4 4 Slide Wire Machines
5—Baird No. 4—Four Slide Wire Machines
7—Waterbury Step Cone Wire Drawing Machines
1—Two Spindle Bull Block Motor Driven
6—Lewis Welding Wire S. & C. Machines M. D.
2—Shuster Shaped Wire S. & C. Machines ½" & ¾" Square, Hexagon & Round Stock Capacities
8—Shuster Round Wire Straightening & Cutting Machines 1/32"-½"

Wanted: Tack Making Machinery. All Sizes.

NATIONAL MACHINERY EXCHANGE
128-138 MOTT ST. NEW YORK, N. Y.

MACHINES FOR THE LINEAR MEASUREMENT OF WIRE

Patented and Exclusive "3V" Principle Provides New Standard of Accuracy

LYON-VAIL MACHINE CO., INC.
97 Belmont St. Brockton, Mass.

MOSSBERG
PRESSED STEEL CORP.
ATTLEBORO, MASS.
STEEL REELS AND SPOOLS

EYELETS
ZINC WIRE
ZINC STRIP
THE PLATT BROS. & CO.
WATERBURY, CONN.

Designers and Builders of Gas-Fired Heat Treating Furnaces for Ferrous and Non-Ferrous Wire.
SURFACE COMBUSTION
Main Plant & General Offices - Toledo, Ohio

WIRE DRAWING MACHINERY AND EQUIPMENT
Rod Frames — 16" Frames, 8" Frames — Take-Up Frames, Wire Pointers — Puller Tongs.
General and heat resisting alloy castings for wire mill use.
Circulars on Request.
E. J. SCUDDER FOUNDRY & MACHINE CO.
TRENTON, N. J.

RUESCH
Machinery For
Wire, Tube, and Brass Mills
409 Mulberry St., Newark, N. J.

BRODEN
Wire Mill and Cold Rolling Equipment
Broden Construction Co.
22800 Lakeland Blvd.
CLEVELAND, OHIO

MANUFACTURERS OF
WIRE BRAIDING — SPOOLING — TAPING
WINDING AND SPECIAL MACHINES
SINFRA WIRE COVERING MACHINES
FIDELITY MACHINE CO.
3908-18 Frankford Ave., Phila., Pa.

APCO MOSSBERG CO.
the original Frank Mossberg Co.
Manufacturers of Reels and Spools
Attleboro, Mass.

Wire Measuring
PRODUCTIMETERS
Precision-built for accuracy and speed. Most complete line offered.
SEND FOR CATALOG No. 3
DURANT MANUFACTURING CO.
1918 N. Buffum St. Milwaukee, Wis.
178 Eddy Street Providence, R.I.

MACHINERY
for
WIRE INDUSTRY
NEW ENGLAND BUTT CO.
PROVIDENCE, R. I.

Editorial Correction

IN an editorial note regarding the die sizes produced by the National Wire Die Company in the October Issue of WIRE & WIRE PRODUCTS on Page 628, the size of dies produced by that company was given as .0039. This was a typographical error and should have read .00039.

✦ ✦ ✦

Vaughn Machinery Issues New Illustrated Catalog

A NEW illustrated catalog entitled "In the Front Line of Victory Production" has just been issued by the **Vaughn Machinery Company** of Cuyahoga Falls, Ohio.

✦ ✦ ✦

THIS catalog illustrates the complete line of cold drawing equipment produced by this company including Motoblocs and Motoblox, Vaughn cold drawing benches, Vaugh continuous machines for wet drawing of all metals, auxiliary equipment including pointers, die stringers, tinning frames, reels, strippers, wire flippers, etc.

✦ ✦ ✦

THE outstanding performance of Vaughn's wire drawing machinery is well-known and is secured through precision manufacturing methods in the plant.

✦ ✦ ✦

UNDER strict engineering control the machining process throughout construction is subject to relentlessly exact progress inspections, with the close tolerances required and set by the designers achieved and proven at every stage.

✦ ✦ ✦

A COPY of the booklet may be obtained by addressing the Vaughn Machinery Company, Cuyahoga Falls, Ohio.

WIRE, WIRE ROPE AND ELECTRIC CABLE MACHINERY
THOMSON-JUDD
WIRE MACHINERY COMPANY
SUBSIDIARY OF
THOMSON-GIBB ELECTRIC WELDING COMPANY
LYNN, MASSACHUSETTS
WRITE FOR CATALOGUE

ROYLE
PATERSON N.J.
BUILDING EXTRUDERS SINCE 1880
Insulating Machinery for Western Electric Continuous Vulcanizing process.
JOHN ROYLE & SONS
PATERSON, N. J.
British Agency: James Day (Machinery) Ltd., The Grange, Whetstone, Nr. Leicester, England

WATERPROOF
and
CREPE PAPER
in rolls of any size for wrapping coils and reels.
CREPE-KRAFT BARREL LINERS
THE CREPE-KRAFT COMPANY
Tel.: Market 2-0375
112 Adams St. Newark, N. J.

DAVIS
SPARKERS
R. L. DAVIS ELECTRIC CO.
340 Center Street,
Wallingford, Conn.

Music Wire In All Sizes
SPECIAL SPECIFICATIONS
New York Sales Agency: 42 Broadway
Tel. Bowling Green 9-7149
Factory: 84 Colt Street, Irvington, N. J.
JERSEY STEEL & WIRE CORPORATION

SCOTT TESTERS
For WIRE, RUBBER, TEXTILES, PAPER, Etc.
HENRY L. SCOTT CO.
PROVIDENCE, R. I.

ACID PROOF BRICK
for
Pickling Tank Construction
Toronto Acid Brick
KEAGLER BRICK COMPANY
STEUBENVILLE, OHIO

Annealing Pots and Boxes
Galvanizing Kettles
Lead and Spelter Pans
Pressure Vessels
NATIONAL ANNEALING BOX CO.
Established 1895
Washington, Penna.

CLEVELAND TRAMRAIL
Division of
THE CLEVELAND CRANE & ENGINEERING CO.
WICKLIFFE, OHIO
Leading manufacturers of
OVERHEAD MATERIALS HANDLING EQUIPMENT
for the Wire and Wire Products Industry

Index To Advertisers

A

Ajax Electric Co., Inc. 666
Ajax Industrial Supplies, Inc. 682
American Chemical Paint Co. 683
American Insulating Machinery Co. 678
Apco Mossberg Co. 684
Apex Alkali Products Co. 679

B

Balloffet Dies & Nozzle Co., Inc. 682
Bethlehem Steel Co. 638
Bick, Hans C., Inc. 683
Broden Construction Co., The 684

C

Callite Tungsten Corp. 676
Carboloy Company, Inc. 637
Carl-Mayer Corp., The ..... Inside Front Cover
Cleveland Tramrail Div. of Cleveland Engineering Co. 684
Cochaud Wire Die Corp. 682
Continental Steel Corp. 680
Crepe-Kraft Co., The 684

D

Davis, R. L., Electric Co. 684
Durant Mfg. Co. 684

E

Electric Furnace Company ..... Back Cover
Emory, Robert J., Co. 683

F

Fidelity Machine Co. 684
Firth-Sterling Steel Co. 646
Fort Wayne Wire Die, Inc. 682

G

Gilron Products Co., Inc. 679
Glader, Wm., Machine Works 672

H

Hartley, Geo. D. 683
Hubbard Spool Company 683
Hudson Wire Co. ..... Inside Back Cover
Hy-Carbo Steel Company 683

I

Indiana Wire Die Co. 682

J

Jersey Steel & Wire Corp. 684
Jones & Laughlin Steel Corp. 651

K

Keagler Brick Co. 684
Kelly Wire Die Corp. 682
Keystone Steel & Wire Co. 667
Krause, F., & Co., The 682

L

Lancaster, Allwine & Rommel 681
Lewis, K. B. 683
Lewis Machine Co., The 678
Lyon-Vail Machine Co., Inc. 683

M

Micro Products Co. 662
Miller, R. H., Co., Inc. 680
Morgan Construction Co. 644
Moslo Machinery Co. 665
Mossberg Pressed Steel Corp. 683

N

National Annealing Box Co. 684
National Erie Corp. 669
National Machinery Exchange 683
New England Butt Co. 684
Niagara Blower Company 671
Nilson, A. H., Machine Co. 678
Norton Company 677

O

Oakite Products, Inc. 679
O'Neil-Irwin Mfg. Co. 678

P

Platt Bros. & Co., The 684
Porter, H. K., Inc. 679

R

Robertson, John, Co., Inc. 668
Robinson Mfg. Company 670
Ross, J. O., Engineering Corp. 683
Royle, John & Sons 684
Ruesch, H. J., Machine Co. 684
Rusch Wire Die Corp. 682

S

Scott, Henry L., Co. 684
Scudder, E. J., Foundry & Machine Co. 684
Shuster, F. B., Co. 683
Sleeper & Hartley, Inc. 652
Standard Industrial Compounds Co. 680
Standard Machinery Company 640
Stevens Metal Products Co., The 645
Surface Combustion Div. of General Properties Co., Inc. 684
Syncro Machine Co. 641

T

Taylor-Wilson Mfg. Co. 639
Thomson-Judd Wire Machinery Co. 684
Trauwood Engr. Co. 643
Tungsten Electric Corp. 673

V

Vascoloy-Ramet Corp. 642
Vaughn Machinery Co. ..... Front Cover
Vianney Wire Die Works 681

W

Warner Company 676
Waterbury-Farrel Fdry. & Machine Co. 683
Watson Machine Co. 674
Wayne Wire Die Co. 682
Willey's Carbide Tool Co. 681

WHERE TO BUY

For more complete information, consult the annual Wire and Wire Products Directory, Index & Buyers' Guide.

ABRASIVES—
Norton Co., Worcester, Mass.

ACID INHIBITORS—
American Chemical Paint Co., Ambler, Pa.

AIR DRAW FURNACES—
Carl-Mayer Corp., The, Cleveland, Ohio.

ALKALINE CLEANERS—
American Chemical Paint Co., Ambler, Pa.

ANNEALING MACHINES—Open Flame
Syncro Machine Co., Rahway, N. J.

ANNEALING POTS AND BOXES—
National Annealing Box Co., Washington, Penna.
Scudder, E. J., Foundry & Machine Co., Trenton, N. J.

ARMORING EQUIPMENT—
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

BAKERS—Hi-Speed
Carl-Mayer Corp., The, Cleveland, Ohio.

BAKERS—Rod and Wire
Carl-Mayer Corp., The, Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
Moslo Machinery Co., Cleveland, Ohio.
Ross, J. O., Engineering Corp., New York, N. Y.

BENDERS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

BERYLLIUM COPPER — Strip and Bars
Callite Tungsten Corp., Union City, N. J.

BOBBINS—Braider and Wire Weaving
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

BORON CARBIDE—
Norton Co., Worcester, Mass.

BRAKES & SHEARS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

CARRIERS—Braider, High Speed
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.

CASTINGS—Wire Mill
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

CEMENTS—Refractory
Norton Co., Worcester, Mass.

CHEMICALS—Cleaning
American Chemical Paint Co., Ambler, Pa.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

CLEANERS—Hand and Metal
American Chemical Paint Co., Ambler, Pa.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

CLEANING & PICKLING EQUIPMENT—
Broden Construction Co., Cleveland, O.
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

WHERE TO BUY, Continued

CLOTH TESTERS—
Scott, Henry L., Co., Providence, R. I.

CLOTH—Wire, All Metals
Callite Tungsten Corp., Union City, N. J.

COATING COMPOUNDS—
Gilron Products Co., Inc., Cleveland, Ohio.

COILERS—Sheet, Strip and Wire
Broden Construction Co., Cleveland, O.
Ruesch, H. J., Machine Co., Newark, N. J.

COLD HEADERS—
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

COMPOUNDS—Coppering
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Metal Finishing
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Rust Preventing
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Rust Removing
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Wire Drawing
Gilron Products Co., Inc., Cleveland, Ohio.
Oakite Products, Inc., New York, N. Y.
Richards, G. Whitfield, Philadelphia, Pa.
Standard Industrial Compounds Co., Chicago, Ill

CONTROLS—Heat Treating
Niagara Blower Co., Buffalo, N. Y.

CONTROLS—Temperature
Niagara Blower Co., Buffalo, N. Y.

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUSTOM WIRE DRAWING—
Hy-Carbo Steel Co., Lowell, Mass.

CUTTING TOOLS—Carbide
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Vascoloy-Ramet Corp., North Chicago, Ill.

CUTTING TOOLS—Wire
Porter, H. K., Inc., Everett, Mass.

DIAMONDS—Industrial
Callite Tungsten Corp., Union City, N. J.

DIAMOND POWDERS—
Rusch Wire Die Corp., New York, N. Y.

DIAMOND TOOLS—
Rusch Wire Die Corp., New York, N. Y.

DIE MAKING MACHINERY — For Forming Special Shapes
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

DIES—Diamond
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Cochaud Wire Die Corp., New York, N. Y.
Fort Wayne Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Krause, F., & Co., Hillside, N. J.
Rusch Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIES—Lead Extrusion
Robertson, John, Co., Brooklyn, N. Y.

DIES—Repairs & Re-Cutting
Ajax Industrial Supplies Co., Fort Wayne, Ind.
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Cochaud Wire Die Corp., New York, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Fort Wayne Wire Die, Inc., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Krause, F., & Co., Hillside, N. J.
Rusch Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Rod and Tube Drawing
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Tungsten Electric Corp., Union City, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Tantalum Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Tungsten Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Tungsten Electric Corp., Union City, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIRECT ELECTRIC RESISTANCE HEATING—
Trauwood Engineering Co., Cleveland, Ohio.

DRAW BENCHES—
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Foundry & Machine Co., Trenton, N. J.
Standard Machinery Co., Providence, R. I.
Vaughn Machinery Co., Cuyahoga Falls, O.

DRUMS—Flange Steel
Stevens Metal Products Co., Niles, O.

DRUMS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

DRYING EQUIPMENT—
Niagara Blower Co., Buffalo, N. Y.

ENGINEERS—Consulting Wire Mill
Hartley, George D., Worcester, Mass.
Lewis, Kenneth B., Worcester, Mass.

EQUIPMENT—Humidifying
Niagara Blower Co., Buffalo, N. Y.

EQUIPMENT—Industrial Cooling
Niagara Blower Co., Buffalo, N. Y.

EQUIPMENT—Insulation Testing
Davis, R. L., Electric Co., Wallingford, Conn.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FLUXES—Soldering
American Chemical Paint Co., Ambler, Pa.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.

FURNACES—Annealing
Ajax Electric Co., Inc., Philadelphia, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.
Trauwood Engineering Co., Cleveland, Ohio.

FURNACES—Automatic
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.

FURNACES—Brazing
Electric Furnace Co., Salem, O.
Firth-Sterling Steel Co., McKeesport, Pa.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, O.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.

FURNACES—Electric
Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio
Trauwood Engineering Co., Cleveland, Ohio

FURNACES—Hardening & Tempering
Ajax Electric Co., Inc., Philadelphia, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio
Trauwood Engineering Co., Cleveland, Ohio

FURNACES—Lead Melting
Electric Furnace Co., Salem, Ohio
Robertson, John, Co., Brooklyn, N. Y.

FURNACES—Non-Oxidizing
Ajax Electric Co., Inc., Philadelphia, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio

FURNACES—Normalizing
Ajax Electric Co., Inc., Philadelphia, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio

FURNACES—Salt Bath
Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.

FURNACES—Wire, Strip & Sheet
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.

GALVANIZING KETTLES—
National Annealing Box Co., Washington, Penna.

GRINDERS—Roll
Norton Co., Worcester, Mass.

HI-SPEED BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

INHIBITORS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

KETTLES—Galvanizing, Annealing, Tinning, etc.
National Annealing Box Co., Washington, Penna.

LATHES—Die Reaming
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

LIME—
Warner Co., Bellefonte, Pa.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Miller, R. M., Co., Inc., Homer, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

LUBRICANTS—Wire Drawing
Bick, Hans C., Inc., Reading, Pa.
Miller, R. M., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Richards, G. Whitfield, Philadelphia, Pa.
Standard Industrial Compounds Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Robertson, John, Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Watson Machine Co., Paterson, N. J.

MACHINERY—Brazing
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.

MACHINERY—Bunching
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
American Insulating Mach'y. Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Chain Making
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

WHERE TO BUY, Continued

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Robinson Mfg. Co., Muncy, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Coilers
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
New England Butt Co., Providence, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Copper Wire Drawing and Rolling
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire
Fidelity Machine Co., Philadelphia, Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Cutting
Broden Construction Co., Cleveland, Ohio
Lewis Machine Co., The, Cleveland, Ohio
Moslo Machinery, Inc., Cleveland, Ohio
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Shuster, F. B., Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Die Making
Firth-Sterling Steel Co., McKeesport, Pa.

MACHINERY — Die Making for Forming Special Shapes
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

MACHINERY—Draw Benches
Standard Machinery Co., Providence, R. I.

MACHINERY—Edging
Standard Machinery Co., Providence, R. I.

MACHINERY—Enameling
American Insulating Mach'y. Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Extruding
National Erie Corp., Erie, Pa.
Robertson, John, Co., Brooklyn, N. Y.
Royle, John, & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Flat Wire
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Forming
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, Ohio
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Gang Winders
Fidelity Machine Co., Philadelphia, Pa.
Robinson Mfg. Co., Muncy, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

MACHINERY—Insulating
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
National Erie Corp., Erie, Pa.
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Knitting
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Lead Encasing Presses, etc.
Robertson, John, Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
Robertson, John, Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Material Handling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

MACHINERY—Measuring Wire & Cable
Davis, R. L., Electric Co., Wallingford, Conn.
Durant Mfg. Co., Milwaukee, Wis.
Lyon-Vail Machine Co., Inc., Brockton, Mass.
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Glader, Wm., Machine Works, Chicago, Ill.
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Panning
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Pointing
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Quill Winding
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Rubber for Insulating Wire
National Erie Corp., Erie, Pa.
Royle, John, & Sons, Paterson, N. J.

MACHINERY—Rubber Strip Covering
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio
Emory, Robert J., Co., Newark, N. J.
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I. (Special Designs)
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spooling
American Insulating Mach'y Co., Phila., Pa.
Emory, Robert J., Co., Newark, N. J.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Broden Construction Co., Cleveland, Ohio
Lewis Machine Co., The, Cleveland, Ohio
Moslo Machinery, Inc., Cleveland, Ohio
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Shuster, F. B., Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

MACHINERY—Stranding
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Swaging
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Testing
Robinson Mfg. Co., Muncy, Pa.
Scott, Henry L., Co., Providence, R. I.

MACHINERY—Testing Size of Wire
Davis, R. L., Electric Co., Wallingford, Conn.

MACHINERY—Testing Spring
Standard Machinery Co., Providence, R. I.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Trolley Wire
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Welding Wire
Micro Products Co., Chicago, Ill.
Shuster, F. B., Co., New Haven, Conn.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Bending
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

MACHINERY—Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Robinson Mfg. Co., Muncy, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Wire Measuring
Durant Mfg. Co., Milwaukee, Wis.
Lyon-Vail Machine Co., Inc., Brockton, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.

WHERE TO BUY, Continued

Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Tinning
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Wood Screw
National Machinery Exchange (Used), New York, N. Y.

MATERIAL HANDLING EQUIPMENT
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

MILLS—Tandem Rolling and Edging
Standard Machinery Co., Providence, R. I.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Hudson Wire Co., Ossining, N. Y.

OILS—Wire Drawing
Richards, G. Whitfield, Philadelphia, Pa.
Standard Industrial Compounds Co., Chicago, Ill.

OVENS—Industrial
Carl-Mayer Corp., The, Cleveland, Ohio
Ross, J. O., Engineering Corp., New York, N. Y.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PAINTS—Marine
American Chemical Paint Co., Ambler, Pa.

PAINTS—Structural Steel
American Chemical Paint Co., Ambler, Pa.

PANS—Lead and Spelter
National Annealing Box Co., Washington, Penna.

PANS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

PAPER—Creped Wrapping
Crepe-Kraft Co., Newark, N. J.

PAPER TESTERS—
Scott, Henry L., Co., Providence, R. I.

PATENT ATTORNEYS—
Lancaster, Allwine and Rommel, Washington, D. C.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.

PICKLING TANK LININGS—
Keagler Brick Co., Steubenville, Ohio.

PLASTIC TESTERS—
Scott, Henry L., Co., Providence, R. I.

POTS—Lead Melting
Robertson, John, Co., Brooklyn, N. Y.

POWDER—Wire Drawing
Richards, G. Whitfield, Philadelphia, Pa.

PRESSES—Hydraulic and Mechanical
Robertson, John, Co., Brooklyn, N. Y.
Standard Machinery Co., Providence, R. I. (Mechanical Only)

PRESSES—Lead
Robertson, John, Co., Brooklyn, N. Y.

PRESSURE VESSELS—
National Annealing Box Co., Washington, Penna.

PULLERS—Wire
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.

PUMPS—Hydraulic
Robertson, John, Co., Brooklyn, N. Y.

QUENCHING BATH CONTROLS—
Niagara Blower Co., Buffalo, N. Y.

REEL AND TENSION STAND—
Fidelity Machine Co., Philadelphia, Pa.
Moslo Machinery, Inc., Cleveland, Ohio
Robinson Mfg. Co., Muncy, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS—Annealing and Stranding
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery, Inc., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Co., New Haven, Conn.
Stevens Metal Products Co., Niles, O.

REELS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS AND SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Takeoff
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery, Inc., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Co., New Haven, Conn.
Stevens Metal Products Co., Niles, O.

REELS—Vulcanizing and Impregnating
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Co., New Haven, Conn.
Stevens Metal Products Co., Niles, O.

REELS—Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery, Inc., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REFRACTORIES—High Temperature
Norton Co., Worcester, Mass.

ROD BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio
Moslo Machinery, Inc., Cleveland, Ohio
Ross, J. O., Engineering Corp., New York, N. Y.

RODS—Wire—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.

RODS—Wire—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

ROLL STRAIGHTENERS—
Moslo Machinery, Inc., Cleveland, Ohio

RUBBER AND RUBBER COMPRESSION TESTERS—
Scott, Henry L., Co., Providence, R. I.

RUST PROOF COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.

RUST REMOVING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.

SHEARS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

SHEET—Steel
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.

SOAPS—Industrial and Wire Drawing
Miller, R. H., Co., Homer, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

SPOOLS—Annealing and Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

SPOOLS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

STAMPINGS—Steel
Hubbard Spool Co., Chicago, Ill
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRIP—Brass and Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.

STRIP METAL TESTERS—
Scott, Henry L., Co., Providence, R. I.

SWIFTS—Take-off
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.

TANK LININGS—Brick
Keagler Brick Co., Steubenville, Ohio.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TANKS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.

TEMPERATURE CONTROLS—
Niagara Blower Co., Buffalo, N. Y.

TENSILE TESTERS—
Scott, Henry L., Co., Providence, R. I.

TESTING INSTRUMENTS—
Scott, Henry L., Co., Providence, R. I.

TOOLS—Wire Cutting
Porter, H. K., Inc., Everett, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TREADS—Safety
Norton Co., Worcester, Mass.

TRUCKS—
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

TUBE BENDERS AND FORMERS—
Ruesch, H. J., Machine Co., Newark, N. J.

TURKS HEADS—Friction and Power Driven
Standard Machinery Co., Providence, R. I.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

WELDERS—Spot and Butt
Micro Products Co., Chicago, Ill.
Moslo Machinery, Inc., Cleveland, Ohio

WIRE—Cold Heading
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE DRAWING—High Grade Custom
Hy-Carbo Steel Co., Lowell, Mass.

WIRE—Electric
Hudson Wire Co., Ossining, N. Y.

WIRE—Enameled for Coils
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Manufacturers
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE—Music
Jersey Steel & Wire Corp., Irvington, N. J.

WIRE—Nickel Silver and Phosphor Bronze
Callite Tungsten Corp., Union City, N. J.
Hudson Wire Co., Ossining, N. Y.

WIRE—Non-Ferrous to Specification for Special Purposes
Callite Tungsten Corp., Union City, N. J.
Hudson Wire Co., Ossining, N. Y.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Spring
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE—Stainless Steel
Callite Tungsten Corp., Union City, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE AND STRIP—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WIRE TESTERS—
Scott, Henry L., Co., Providence, R. I.

WIRE, WEAVING—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

WRAPPING PAPER—Creped
Crepe-Kraft Co., Newark, N. J.

YARN TESTERS—
Scott, Henry L., Co., Providence, R. I.

HUDSON WIRE COMPANY

PRODUCERS OF FINE WIRES IN ALL METALS

FINE BARE WIRES

High Brass, Low Brass, Zinc 99.99+ and High Tensile Zinc, Commercial Bronze, Phosphor Bronze, Pure Tin, Lead, Antimonial Lead, Tinsel Lahns, Silver Plated Copper, False Gold and Copper.

Cadmium, Nickel Silver, 10%, 18% and 30%; Silver Plated Copper, False Gold and Special Brass and Bronze Alloys to Specification, Metallic Fibre for Packing Purposes, Copper, Bronze, Zinc, Lead and Aluminum.

WIRES FOR METAL SPRAYING

Pure Lead, Lead Alloy, Pure Zinc, Zinc Alloy, Copper, Tin, High Brass, Low Brass, Solder Wire, High Conductivity, Electric Wire.

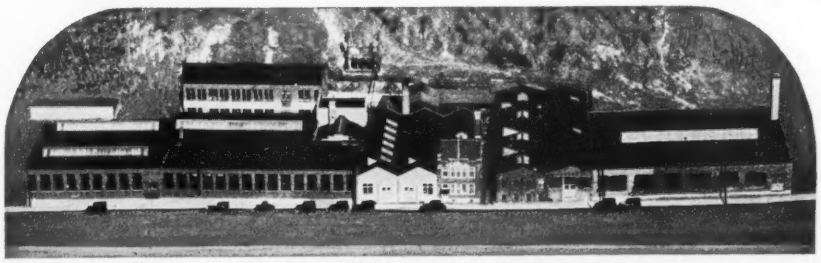
Cadmium, Nickle Silver, (10%, 18%, 30%); Aluminum, Monel Metal, Phosphor Bronze, Pure Nickel, Commercial Bronze.

Look for the name — HUDCO — A guarantee of quality

"HUDCO" specially processed Copper Wire for enamelling purposes is drawn from Selected Copper, insuring the maximum conductivity. This is but one example of the use of the most advanced and approved materials and methods in our processing.

BETTER WIRE AT LOWER COST

Write for Prices and Samples • Let Us Quote on Your Requirements

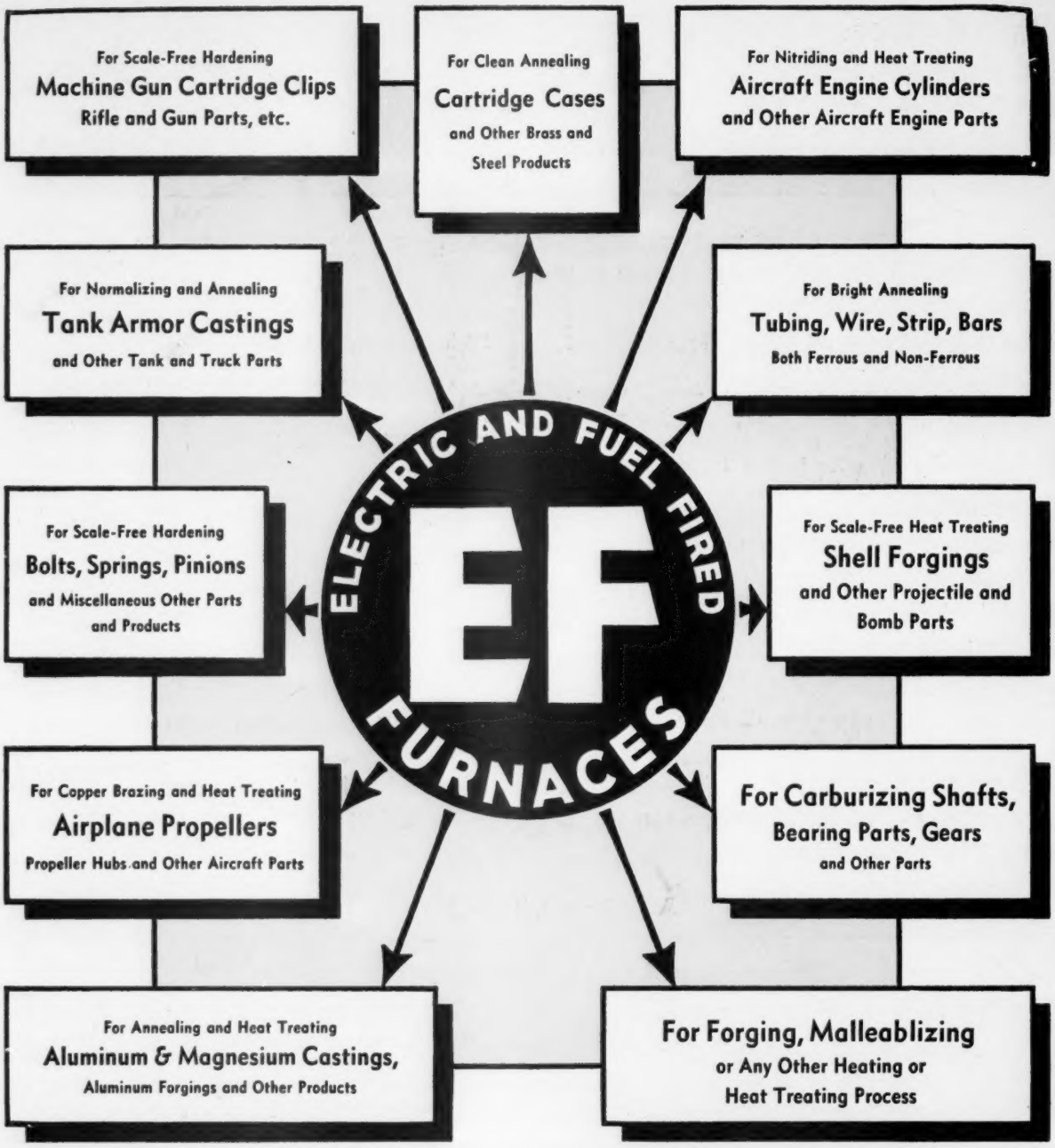


"HUDCO" PLANT AT OSSINING, NEW YORK

HUDSON WIRE COMPANY

Established in 1902 — Successors to Royle & Akin

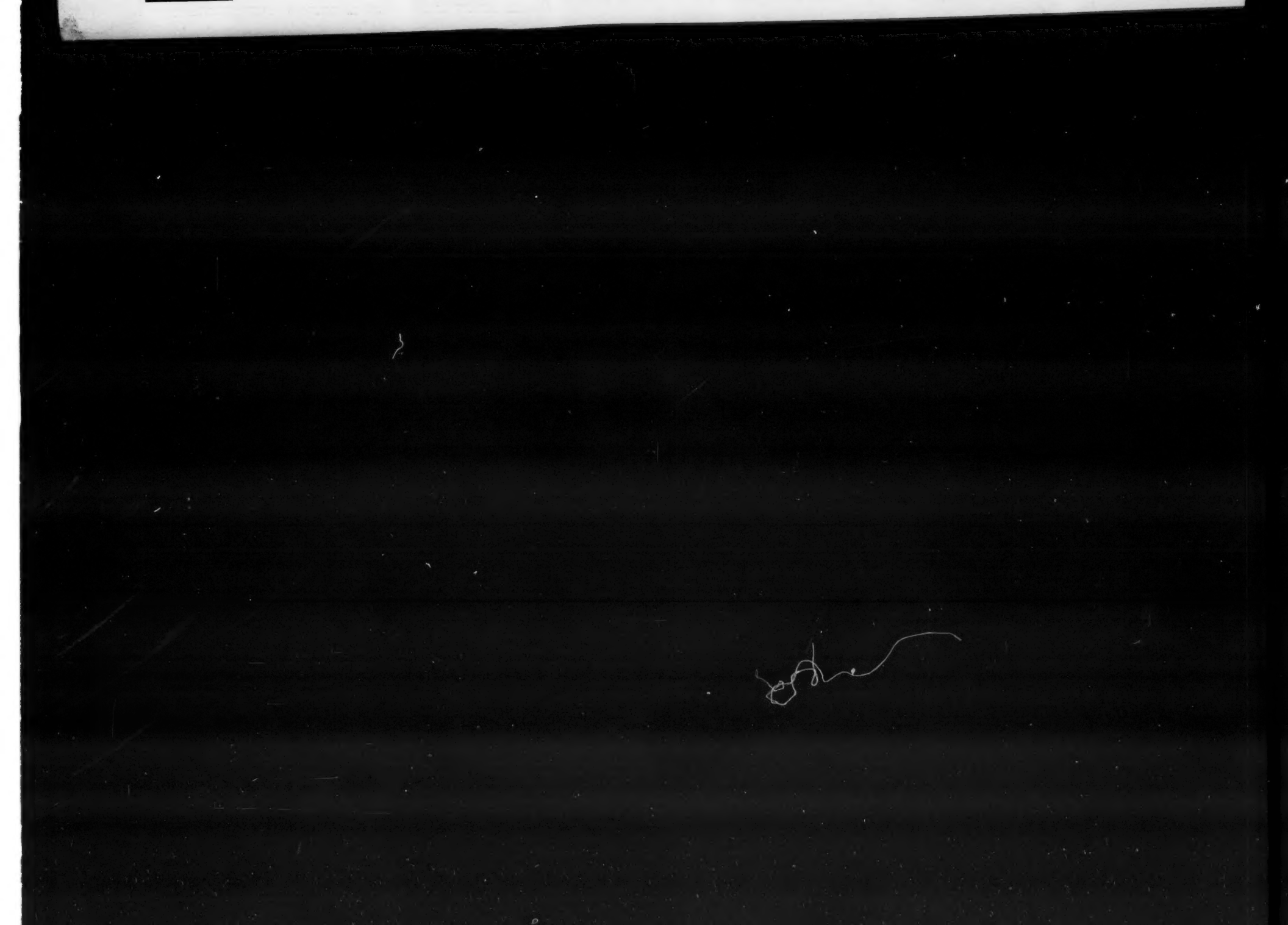
OSSINING, NEW YORK



Increased production and uniformity; the saving of valuable time, labor and metals and other advantages have been effected by recent EF continuous automatic, semi-continuous and batch type furnace installations.

The Electric Furnace Co. specializes in designing and building production furnaces and time and labor saving material handling equipment. Years of practical furnace building experience have enabled EF engineers to develop some outstanding production furnaces for handling the above materials and many other essential war products.

Submit YOUR production furnace problems to EF engineers. Phone 4661, Salem, O.

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces---For Any Process, Product or Production